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July 2, 2018

Ms. Hillary Young, P.E.  
Chief Engineer  
Land Protection Division  
Oklahoma Department of Environmental Quality  
707 North Robinson Avenue  
Oklahoma City, Oklahoma 73102

RE: Tier III Permit Modification Application  
Proposed Lateral Expansion  
East Quarry Construction and Demolition Landfill  
Tulsa County, Oklahoma  
Permit No. 3572049

Dear Ms. Young:

On behalf of APAC-Central, Inc. (APAC), E&E Engineering and Associates, LLC (E&E) is pleased to submit the enclosed Tier III Permit Modification Application for a proposed lateral expansion of the East Quarry Construction and Demolition Landfill in Tulsa County, Oklahoma. For your review, three (3) copies of the application are provided with this letter including one (1) original hard copy and two (2) electronic copies on separate compact disks.

A draft notice of application filing has recently been provided to the Oklahoma Department of Environmental Quality (DEQ) and will be published in a local newspaper once it has been approved. After publication, an Affidavit of Publication will be provided to DEQ.

We appreciate your review of this application and look forward to addressing any comments or questions that you may have. If you have any questions, comments, or need any additional information, please do not hesitate to contact me at 918-957-1300.

Respectfully,  
**E&E Engineering and Associates, LLC.**

A handwritten signature in blue ink that reads "Turgay M. Ertugrul". The signature is written in a cursive style.

Turgay M. Ertugrul, P.E.  
President

Enclosures

Cc: Mr. Kristopher McClanahan, APAC-Central, Inc.  
Mr. William Huckaby, APAC-Central, Inc.  
Mr. Chris Johnson, APAC-Central, Inc.

**TIER III PERMIT MODIFICATION APPLICATION  
PROPOSED LATERAL EXPANSION**

**APAC EAST QUARRY C&D LANDFILL  
TULSA COUNTY, OKLAHOMA  
SW PERMIT NO. 3572049**

**VOLUME 1 OF 2**

**June 20, 2018  
E&E Project No. 105-003**

**Prepared for:  
APAC-Central, Inc.  
Tulsa, Oklahoma**



**Prepared by:  
E&E Engineering and Associates, LLC  
Certificate of Authority No. 7889  
2301 North Yellowwood Avenue | Broken Arrow, Oklahoma 74012  
Phone: 918-957-1300 | Fax: 918-957-1313**

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## **ACRONYMS AND ABBREVIATIONS**

ADC	alternate daily cover
BIA	Bureau of Indian Affairs
Bgs	below ground surface
C&D	Construction and Demolition
CMP	corrugated metal pipe
CWA	Clean Water Act
cy	cubic yard
DEQ	Oklahoma Department of Environmental Quality
DOM	Oklahoma Department of Mines
EPA	United States Environmental Protection Agency
FAA	Federal Aviation Administration
g	earth's gravitational pull
GIS	geographic information system
GRDA	Grand River Dam Authority
GWSAP	Groundwater Sampling and Analysis Plan
HDPE	high density polyethylene
LEL	Lower Explosive Limit
LL	liquid limit
mg/l	milligrams per liter
msl	feet above mean sea level
MSWLF	municipal solid waste landfill
NHIW	non-hazardous industrial waste
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
OAC	Oklahoma Administrative Code
OAS	Oklahoma Archeological Survey
OBS	Oklahoma Biological Survey
OCC	Oklahoma Conservation Commission
OCS	Oklahoma Climatological Survey
ODAFF	Oklahoma Department of Agriculture, Food, and Forestry
ODWC	Oklahoma Department of Wildlife Conservation
OGS	Oklahoma Geological Survey
OPDES	Oklahoma Pollutant Discharge Elimination System
OSRA	Oklahoma Scenic Rivers Act

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OSRC	Oklahoma Scenic Rivers Commission
OWRB	Oklahoma Water Resources Board
PFDS	Precipitation Frequency Data Server
P.G.	Professional Geologist
PGA	peak horizontal acceleration
PI	plasticity index
POTW	publicly owned treatment works
QA	quality assurance
QC	quality control
RCP	reinforced concrete pipe
SEC	Securities and Exchange Commission
SRO	GRDA Scenic Rivers Operation
SWP3	Stormwater Pollution Prevention Plan
TPRD	Tulsa Parks and Recreation Department
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WEP	Waste Exclusion Plan



**APPLICATION TO MODIFY A SOLID WASTE  
DISPOSAL FACILITY PERMIT**

Date: June 20, 2018 County: Tulsa

Send to:

Solid Waste Permitting Unit  
Waste Management Division  
Dept. of Environmental Quality  
707 N. Robinson (PO Box 1677)  
Oklahoma City, OK 73101-1677

<b>FOR DEQ USE</b>	
DEQ Log No.	_____
No. Copies	_____
Date Received:	_____

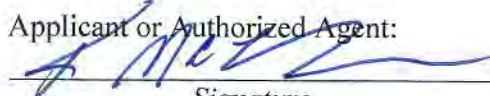
APAC-Central, Inc. proposes to modify the permit of  
*(Applicant's Name)*  
the East Quarry C&D Landfill, located at (See Attached)  
*(Facility Name)* *(Exact legal description;*  
*metes & bounds, platted lot, or land survey. Append extra sheets if necessary)*

in Tulsa County, Oklahoma. We hereby make application for a modification of existing permit number 3572049 as required by the **Oklahoma Solid Waste Management Act** and the Rules pursuant thereto.

Remarks & brief description of proposed modification:

The proposed modification is for a 55.77-acre lateral expansion of the existing C&D landfill waste disposal area resulting in a total waste disposal area of 117.25 acres. The modification also includes an increase of the facility permit boundary area from 97.83 acres to 151.71 acres.

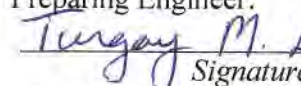
Applicant or Authorized Agent:

  
*Signature*  
Kristopher McClanahan  
*Typed Name*

Address: P.O. Box 580670  
City: Tulsa State: OK

Date signed: 6/20/2018  
Phone: 918-438-2020

Preparing Engineer:

  
*Signature*  
Turgay M. Ertugrul  
*Typed Name*

Address: 2301 N. Yellowwood Ave.  
City: Broken Arrow State: OK

Date signed: 6/20/2018  
Phone: 918-957-1300



Facility Address (if any): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

<b>DEQ USE ONLY</b>
---------------------



Engineering  
Land Surveying  
Land Planning

Sisemore Weisz & Associates, Inc.

6111 E. 32<sup>ND</sup> PLACE

TULSA, OK 74135

Voice (918) 665-3600

Fax (918) 665-8668

**WASTE DISPOSAL BOUNDARY LEGAL DESCRIPTION**

A TRACT OF LAND THAT IS PART OF THE NORTHWEST QUARTER (NW/4) OF SECTION SIXTEEN (16), TOWNSHIP TWENTY (20) NORTH, RANGE FOURTEEN (14) EAST OF THE INDIAN BASE AND MERIDIAN, TULSA COUNTY, STATE OF OKLAHOMA, ACCORDING TO THE U.S. GOVERNMENT SURVEY THEREOF, SAID TRACT OF LAND BEING DESCRIBED AS FOLLOWS:

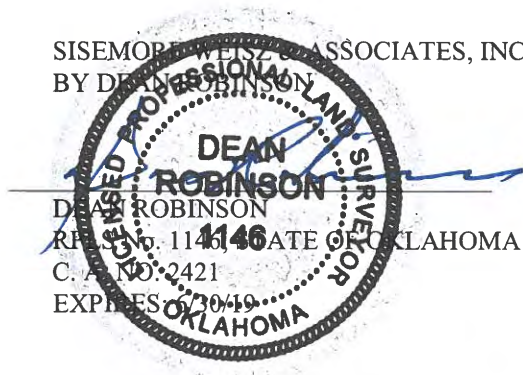
COMMENCING AT THE NORTHWEST CORNER OF SECTION 16; THENCE SOUTH 01°05'39" EAST ALONG THE WESTERLY LINE OF THE NW/4 FOR 848.78 FEET; THENCE NORTH 88°54'21" EAST FOR 226.99 FEET TO THE POINT OF BEGINNING OF SAID TRACT OF LAND; THENCE NORTH 61°42'19" EAST FOR 388.49 FEET; THENCE NORTH 67°59'51" EAST FOR 474.23 FEET; THENCE NORTH 79°16'18" EAST FOR 86.44 FEET; THENCE NORTH 83°05'01" EAST FOR 102.42 FEET; THENCE NORTH 83°08'55" EAST FOR 75.06 FEET; THENCE NORTH 78°51'56" EAST FOR 166.98 FEET; THENCE NORTH 71°13'18" EAST FOR 140.21 FEET; THENCE NORTH 74°20'46" EAST FOR 45.33 FEET; THENCE NORTH 80°49'31" EAST FOR 105.32 FEET; THENCE NORTH 64°34'12" EAST FOR 211.78 FEET; THENCE NORTH 39°22'30" EAST FOR 165.99 FEET; THENCE NORTH 73°57'12" EAST FOR 515.20 FEET; THENCE SOUTH 04°31'49" EAST FOR 256.52 FEET; THENCE SOUTH 04°46'23" EAST FOR 63.43 FEET; THENCE SOUTH 03°32'37" EAST FOR 134.22 FEET; THENCE SOUTH 00°59'16" EAST FOR 114.52 FEET; THENCE SOUTH 01°56'06" EAST FOR 147.52 FEET; THENCE SOUTH 01°27'44" EAST FOR 56.77 FEET; THENCE SOUTH 00°11'41" WEST FOR 149.24 FEET; THENCE SOUTH 00°12'33" EAST FOR 100.00 FEET; THENCE SOUTH 00°11'47" EAST FOR 100.00 FEET; THENCE SOUTH 00°00'43" EAST FOR 100.00 FEET; THENCE SOUTH 00°06'25" WEST FOR 441.21 FEET; THENCE SOUTH 00°00'02" EAST FOR 937.64 FEET; THENCE SOUTH 88°34'25" WEST FOR 2295.52 FEET; THENCE NORTH 00°43'03" WEST FOR 1290.48 FEET; THENCE NORTH 01°05'11" WEST FOR 499.26 FEET TO THE POINT OF BEGINNING OF SAID TRACT OF LAND.

THE ABOVE DESCRIBED TRACT OF LAND CONTAINING 5,107,943 SQUARE FEET OR 117.262 ACRES, MORE OR LESS.

**WASTE DISPOSAL BOUNDARY LEGAL DESCRIPTION CERTIFICATION**

I, DEAN ROBINSON, OF SISEMORE WEISZ & ASSOCIATES, CERTIFY THAT THE ATTACHED LEGAL DESCRIPTION CLOSES IN ACCORD WITH EXISTING RECORDS AND IS A TRUE REPRESENTATION OF THE WASTE DISPOSAL BOUNDARY AS DESCRIBED. THIS LEGAL DESCRIPTION MEETS THE MINIMUM STANDARDS FOR LEGAL DESCRIPTIONS AS ADOPTED BY THE OKLAHOMA STATE BOARD OF LICENSURE FOR PROFESSIONAL ENGINEERS AND LAND SURVEYORS.

6.04.18  
DATE





Engineering  
Land Surveying  
Land Planning

Sisemore Weisz & Associates, Inc.

6111 E. 32<sup>ND</sup> PLACE

TULSA, OK 74135

Voice (918) 665-3600

Fax (918) 665-8668

**SITE PERMIT BOUNDARY LEGAL DESCRIPTION**

A TRACT OF LAND THAT IS PART OF THE SOUTHWEST QUARTER (SW/4) OF SECTION NINE (9) AND PART OF THE NORTHWEST QUARTER (NW/4) OF SECTION SIXTEEN (16), TOWNSHIP TWENTY (20) NORTH, RANGE FOURTEEN (14) EAST OF THE INDIAN BASE AND MERIDIAN, TULSA COUNTY, STATE OF OKLAHOMA, ACCORDING TO THE U.S. GOVERNMENT SURVEY THEREOF, SAID TRACT OF LAND BEING DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHWEST CORNER OF SECTION 16, THE SAME BEING THE SOUTHWEST CORNER OF SECTION 9; THENCE SOUTH 01°05'39" EAST ALONG THE WESTERLY LINE OF THE NW/4 FOR 818.26 FEET; THENCE NORTH 88°54'21" EAST FOR 52.75 FEET TO THE POINT OF BEGINNING OF SAID TRACT OF LAND; THENCE NORTH 88°54'13" EAST FOR 124.25 FEET; THENCE NORTH 61°42'19" EAST FOR 421.75 FEET; THENCE NORTH 67°59'51" EAST FOR 339.39 FEET; THENCE NORTH 00°02'43" WEST FOR 277.50 FEET TO A POINT ON THE SOUTHERLY RIGHT-OF-WAY LINE OF HIGHWAY 266 AND A POINT OF CURVE; THENCE NORTHEASTERLY ALONG A CURVE TO THE LEFT HAVING AN INITIAL TANGENT BEARING OF NORTH 80°18'13" EAST, WITH A CENTRAL ANGLE OF 11°58'31", A RADIUS OF 8769.40 FEET, A CHORD BEARING OF NORTH 74°18'58" EAST, A CHORD DISTANCE OF 1829.55 FEET, FOR AN ARC LENGTH OF 1832.89 FEET TO A POINT ON THE EASTERLY LINE OF THE SW/4 OF SECTION 9; THENCE SOUTH 01°22'27" EAST ALONG SAID EASTERLY LINE OF THE SW/4 FOR 226.70 FEET TO THE SOUTHEAST CORNER OF SAID SW/4, THE SAME BEING THE NORTHEAST CORNER OF THE NW/4 OF SECTION 16; THENCE SOUTH 01°05'45" EAST ALONG THE EASTERLY LINE OF THE NW/4, AND ALONG THE EASTERLY LINE OF THE SW/4 OF SECTION 16, FOR 2781.69 FEET; THENCE SOUTH 88°34'25" WEST FOR 2593.27 FEET; THENCE NORTH 01°05'39" WEST PARALLEL TO THE WESTERLY LINE OF SECTION 16 FOR 1971.19 FEET TO THE POINT OF BEGINNING OF SAID TRACT OF LAND.

THE ABOVE DESCRIBED TRACT OF LAND CONTAINING 6,608,682 SQUARE FEET OR 151.714 ACRES, MORE OR LESS.

**SITE PERMIT BOUNDARY LEGAL DESCRIPTION CERTIFICATION**

I, DEAN ROBINSON, OF SISEMORE WEISZ & ASSOCIATES, CERTIFY THAT THE ATTACHED LEGAL DESCRIPTION CLOSES IN ACCORD WITH EXISTING RECORDS AND IS A TRUE REPRESENTATION OF THE SITE PERMIT BOUNDARY AS DESCRIBED. THIS LEGAL DESCRIPTION MEETS THE MINIMUM STANDARDS FOR LEGAL DESCRIPTIONS AS ADOPTED BY THE OKLAHOMA STATE BOARD OF LICENSURE FOR PROFESSIONAL ENGINEERS AND LAND SURVEYORS.

6.04.18  
DATE

SISEMORE WEISZ & ASSOCIATES, INC.  
BY DEAN ROBINSON

DEAN ROBINSON  
RPLS No. 1146, STATE OF OKLAHOMA  
C. A. N. 2421  
EXPIRES 6/30/2018



VERIFICATION<sup>1</sup>

STATE OF OKLAHOMA )  
 )  
COUNTY OF TULSA ) ss

Kristopher McClanahan, of lawful age, being first duly sworn, upon oath state that I have read the foregoing APPLICATION TO MODIFY A SOLID WASTE DISPOSAL FACILITY PERMIT, that I am familiar with the matters set forth therein, and that the same are true to the best of my information and belief.



Applicant

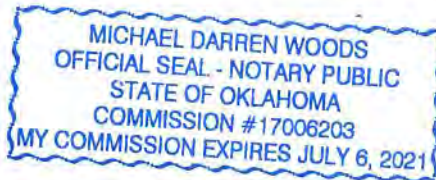
Subscribed and sworn to before me this 20 day of June, 2018,  
by Kristopher McClanahan (Applicant or legal representative).



Notary Public

My commission expires:

July 6 2021



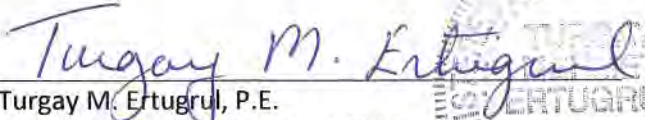
<sup>1</sup> This Verification is required for a Tier III modification application.

## CERTIFICATION STATEMENT

I certify that this Tier III Permit Modification Application document and all attachments were prepared under my direction or supervision in accordance with good engineering practice and that this report is to the best of my knowledge and belief, true, accurate, and complete. This certification is contingent of the fact that all information supplied to the signatory authority to the date of this certification, is unquestionably accurate and was provided in good faith.

**E&E Engineering and Associates, LLC**

Certificate of Authority No. 7889

  
Turgay M. Ertugrul, P.E.  
Oklahoma Registration No. 16948



## 1.0 INTRODUCTION AND OVERVIEW

This document constitutes a Tier III Permit Modification Application for a proposed 55.76-acre lateral expansion of the East Quarry C&D Landfill (EQL) located in Tulsa, Oklahoma. The information provided in this application is intended to comply with the requirements set forth by the Oklahoma Uniform Environmental Permitting Act and Oklahoma Administrative Code (OAC) 252:515 for solid waste Tier III permit modification applications.

### 1.1 BACKGROUND

EQL is owned and operated by APAC-Central, Inc. (APAC) and has been providing the Tulsa metropolitan area and surrounding communities with construction and demolition (C&D) waste disposal services for over 15 years. EQL is located approximately one (1) mile east of U.S. Highway 169 on the south side of East 46<sup>th</sup> Street North which is also designated as Oklahoma Highway 266. The general location of EQL is depicted in **Figure 1**.

EQL is situated within an existing limestone quarry which is also owned and operated by APAC. The quarry site, referred to as the East Quarry, has been in operation since the 1980s and is permitted through the Oklahoma Department of Mines (DOM). The East Quarry site includes offices, a 300-acre active limestone quarry, several operations for processing limestone, an asphalt plant, and a construction shop. The East Quarry facilities are located on East 36<sup>th</sup> Street North while the entrance and scale house for EQL is located on East 46<sup>th</sup> Street North.

The initial Tier III Permit Application for EQL was submitted to the Oklahoma Department of Environmental Quality (DEQ) in July 2001. The application proposed the siting of a 97.83-acre C&D waste disposal facility within the northern portion of the East Quarry where mining operations had been completed. The proposed landfill area consisted primarily of unmarketable rock, mine spoil, and exposed underlying shale. Upon approval of the initial permit application, DOM transferred jurisdiction of the proposed landfill area to the DEQ Land Protection Division. On May 2, 2002 DEQ issued the original permit authorizing APAC to “construct, operate, maintain and close a C&D landfill in Tulsa County, Oklahoma” under DEQ solid waste permit number 3572049. The current landfill permit provides for a facility permit boundary consisting of 97.83-acres and a waste disposal area consisting of 61.5 acres. Approximately 50.6 acres of the permitted waste disposal area has been developed and approved for waste disposal as of the date of this application.

### 1.2 PURPOSE AND SCOPE OF PROPOSED EXPANSION

The purpose of this Tier III Permit Modification Application is to expand the permitted landfill operations primarily towards the south. The proposed expansion will ensure that the critical service provided by EQL will continue for the landfill’s service area.

The proposed lateral expansion will increase the waste disposal area of EQL by 55.76-acres resulting in a total waste disposal area of 117.26-acres. The expansion will include a 50.46-acre lateral expansion of the waste disposal boundary to the south of the existing permit limit. Design changes related to the undeveloped western side of the existing permit area will result in a reduction of permitted waste

disposal area along the western boundary and an increase of waste disposal area in the northwest corner resulting in a net increase of 5.30-acres. Design changes are also proposed to the northeast corner of the existing permit area which results in no net change in actual waste disposal area.

The maximum permitted final cover elevation for the site will increase to 806 feet above mean sea level (msl), and the resulting design capacity increase will be approximately 13,420,676 cubic yards (cy).

## 2.0 GENERAL INFORMATION

This section provides general information regarding EQL and APAC as required by OAC 252:515-3 for solid waste permit applications and modifications.

### 2.1 OATH [OAC 252:515-3-33]

OAC 252:515-3-33 requires the applicant to sign the permit application under oath on forms provided by DEQ. The signed oath is provided at the beginning of this application document.

### 2.2 OWNER/OPERATOR CONTACT INFORMATION [OAC 252:515-3-36(a)(1)]

In accordance with OAC 252:515-3-36(a)(1), the owner/operator contact information for EQL is listed below.

**Owner/Operator:** APAC-Central, Inc.  
**Mailing Address:** P.O. Box 580670  
Tulsa, Oklahoma 74158  
**Telephone Number:** (918) 438-2020  
**Primary Contacts:** Mr. Kristopher McClanahan, General Manager  
Mr. William Huckaby, Operations Manager

### 2.3 NAME AND TYPE OF FACILITY [OAC 252:515-3-36(a)(2)]

The current permitted name of the facility is "East Quarry Construction and Demolition Landfill." The landfill is an existing C&D landfill facility which provides C&D waste disposal services for residents and businesses in the Tulsa metropolitan area and the surrounding communities. Facility contact information as required by OAC 252:515-3-36(a)(2) is listed below.

**Facility Name:** East Quarry Construction and Demolition Landfill  
**Mailing Address:** P.O. Box 580670  
Tulsa, Oklahoma 74158  
**Physical Address:** 13012 E. Highway 266  
Tulsa, Oklahoma 74146  
**Telephone Number:** (918) 438-0101

### 2.4 OWNER INFORMATION AND DISCLOSURE [OAC 252:515-3-36(a)(3)]

APAC is a wholly owned subsidiary of CRH, plc (CRH). CRH is an international group of diversified building materials businesses which manufacture and supply a wide range of products for the construction industry. APAC is an industry leader in high quality asphalt and concrete pavement construction, materials, and services. APAC has operated EQL since its inception in 2002.

As a wholly owned subsidiary of a publicly held company, Title 27A of the Oklahoma Statutes require APAC to submit the most recent annual and quarterly reports as required by the Securities and Exchange Commission (SEC) for its parent company in lieu of a disclosure statement. Pursuant to the Securities Exchange Act of 1934, CRH is only required to file Form 20-F with the SEC on an annual basis.



The most recent annual report for CRH is provided along with the completed disclosure form in **Appendix A**.

## 2.5 LEGAL DESCRIPTION [OAC 252:515-3-36(a)(4)]

Legal descriptions of the original and proposed permit boundaries are provided in **Appendix B**.

APAC owns over 900-acres of property adjacent to the East Quarry within Sections 20 and 21 of Township 20 North, Range 14 East of the Indian Base and Meridian in Tulsa County, Oklahoma. These properties have historically been used as soil borrow sources for landfill cell construction purposes and remain available for utilization as borrow sources. The title and legal descriptions of the borrow areas are also provided in **Appendix B**.

## 2.6 PROPOSED PERMIT BOUNDARY COORDINATES [OAC 252:515-3-36(a)(5)]

The latitude and longitude coordinates of the corners of the proposed permit boundary and facility entrance are provided in **Table 1** below.

**Table 1: Proposed Permit Boundary Coordinates**

Location	Latitude	Longitude
Facility Entrance	36° 13' 12.49" N	95° 49' 48.73" W
Northwest Corner	36° 13' 06.04" N	95° 49' 58.93" W
Northeast Corner	36° 13' 16.36" N	95° 49' 27.25" W
Southeast Corner	36° 12' 46.61" N	95° 49' 27.36" W
Southwest Corner	36° 12' 46.55" N	95° 49' 59.01" W

## 2.7 LOCATION OF FACILITY [OAC 252:515-3-36(a)(6)]

EQL is located within the Northwest Quarter (1/4) of Section 16, Township 20 North, Range 14 East, and approximately one (1) mile east of U.S. Highway 169 on the south side of Oklahoma Highway 266, within the northeastern city limits of Tulsa in Tulsa County, Oklahoma. The proposed 55.76-acre lateral expansion provides for an increase of the existing permit boundary to the south and to the north. A topographic map depicting the existing landfill and proposed expansion area is provided as **Figure 2**.

## 2.8 LEGAL RIGHT TO PROPERTY (OAC 252:515-3-34)

APAC is the current owner of the property associated with the proposed lateral expansion. A certified affidavit stating that APAC owns the real property is provided in **Appendix C**. A temporary easement has been executed allowing DEQ and/or its contractors the right to access the subject property to perform closure, post-closure monitoring, or corrective action in the event of default by the owner/operator. A copy of the easement is also provided in **Appendix C**.

## 2.9 LAND USE OF ADJACENT PROPERTY AND GENERAL AREA

The two-mile area surrounding EQL is generally described as rural, with undeveloped and cultivated pastures for livestock grazing and scattered heavy to moderate industrial development. Industrial use

primarily involves heavy industry which includes limestone quarrying, asphalt production, cement manufacturing, and commercial solid waste disposal operations. There are no areas of significant population density within two-miles of the site.

Property adjacent to EQL is currently utilized for industrial purposes or as pasture land. EQL is located within an existing limestone quarry, with limestone quarrying and processing activities being conducted north and south of the existing landfill.

Quarry Landfill is located immediately east of EQL. Quarry Landfill is a municipal solid waste landfill (MSWLF) facility owned and operated by Waste Management of Oklahoma, Inc.

Oklahoma Highway 266 is a four (4) lane undivided highway that forms the northern boundary of EQL. North of Oklahoma Highway 266 is a limestone rock quarry operated by APAC.

North 129<sup>th</sup> East Avenue is located along the western property line of EQL. West of 129<sup>th</sup> East Avenue is pastureland used for cattle grazing with some industrial uses.

APAC owns the area south of the landfill to East 36<sup>th</sup> Street North where quarry operations and asphalt production activities are performed. APAC also owns the property south of East 36<sup>th</sup> Street North.

**Figure 3** is a surrounding land use map which shows the limits of the existing and proposed permit boundaries in relation to adjacent properties and depicts the general surrounding land use.

## 2.10 PROPOSED OPERATIONAL DESCRIPTION [OAC 252:515-3-36(a)(7)]

EQL is an active C&D waste disposal facility which commercially accepts, manages, and disposes of C&D waste in accordance with the facility solid waste permit. The proposed lateral expansion will expand the facility permit area from the existing 97.83-acres by 53.98-acres resulting in a new facility permit area of 151.71-acres.

The permitted 61.5-acre waste disposal area will be expanded by approximately 55.76-acres resulting in a total waste disposal area of 117.26-acres. The total lateral expansion consists of three (3) separate areas referred to as the south expansion which consists of 50.46-acres of new waste disposal area, the northwestern expansion which provides 5.30-acres of additional waste disposal area, and the northeastern modification which provides no net change in waste disposal area.

The development plan for EQL consists of four (4) phases as shown on the Permit Drawings. Phase 1 is already constructed and consists of six cells with a total waste disposal area of approximately 22.2-acres. Phase 2 consists of seven cells with a total design area of approximately 33.1-acres. 28.4-acres of Phase 2 have already been constructed as of the date of this application. Phase 3 consists of eight (8) future cells with a total design area of 43.54-acres and Phase 4 consists of four (4) future cells with a total disposal area of approximately 19.59-acres.

The existing stormwater and process water impoundments F01 and F03 located along the western side of the property manages stormwater runoff and leachate from the landfill area and the quarry

operations. Water in the impoundments is used either for dust control on the quarry's non-paved roads, as wash water for cleaning crushed stone or as scrubber water for the APAC asphalt plant. During periods of high rainfall, excess water entering the stormwater system is discharged to Bird Creek in accordance with the facility Oklahoma Pollutant Discharge Elimination System (OPDES) permit through the permitted outfall located north of the landfill site.

Provisions are incorporated into the design of the stormwater management system to ensure that sufficient capacity is maintained to control the run-off associated with a 25-year 24-hour storm event. Prior to the construction of Phase 4, impoundment F03 will be relocated south of the landfill permit area and incorporated into the existing OPDES permit.

The general operational procedures for the landfill will not be altered by this proposed lateral expansion.

### 2.11 WASTE STREAMS [OAC 252:515-3-36(a)(8)]

EQL is currently permitted to accept and dispose of C&D waste materials in accordance with OAC 252:515 and the facility permit. C&D waste is generally composed of the following:

- asbestos-free waste from construction and/or demolition projects that may include such materials as metal, concrete, brick, asphalt, glass, roofing materials, limited amounts of packing materials, sheetrock, or lumber;
- wood waste that may include such materials as yard waste, lumber, woodchips, wood shavings, sawdust, plywood, tree limbs, or tree stumps;
- yard waste that may include such materials as grass clippings, tree limbs, tree stumps, shrubbery, flowers, or other vegetative matter resulting from land clearing or landscaping operations; or
- residential lead-based paint waste.

During the 12-month period beginning on January 1, 2017 and ending on December 31, 2017, EQL accepted 207,719.32 tons of C&D waste at an average rate of 665.8 tons per day.

### 2.12 SERVICE AREA [OAC 252:515-3-36(a)(9-10)]

Waste accepted by EQL generally comes from residents and businesses in the Tulsa metropolitan area and other surrounding communities. EQL's customers generally include homeowners, homebuilders, general contractors, civil contractors, demolition contractors, and home remodelers. During events of natural disasters, EQL has provided waste disposal services for areas beyond the typical service area.

Based on the amount of waste received by C&D disposal facilities in the EQL service area in 2017, it has been estimated that local C&D disposal rate per capita is approximately 1.67 pounds per person per day. Based on this disposal rate and the amount of waste accepted by EQL in 2017, it is estimated that the population served by EQL is approximately 797,227 people.

### 2.13 LIFE AND DESIGN CAPACITY OF FACILITY [OAC 252:515-3-38(7)]

The proposed 55.76-acre lateral expansion of the landfill waste disposal area will increase the design capacity of EQL from 6,827,360 cy to 20,248,036 cy. The design capacity is defined as the total volume of airspace available for waste disposal and daily cover as calculated from the top of the protective cover layer to the bottom of the final cover system. It has been previously estimated that 4,590,305 cy of landfill airspace has been utilized by waste and daily cover as of December 31, 2017. As a result, the complete development of the proposed waste disposal area would provide 15,657,731 cy of remaining airspace as of January 1, 2018.

For the purposes of this document, the design life of site is defined as the remaining life of the permit area if the entire permit area is developed and approved for waste disposal. The design life of site has been calculated in accordance with OAC 252:515-27-8 using the following formula:

$$L = \{[V - (P \times V)] \times D\} \div W, \text{ where}$$

L = Life of the disposal facility in years;

V = Total volume of airspace available for waste disposal and daily cover in cubic yards;

P = Annual percentage of "V" that will be consumed by daily cover;

D = Anticipated density of waste compacted in-place in pounds per cubic yard; and

W = Amount of waste received in the previous year in pounds.

The design life of site calculation was performed utilizing the amount of waste received in the previous year (207,719.32 tons) and the assumption that P = 20% and D = 1,000 lbs/cy as stated in OAC 252:515-27-8(a)(2). Utilizing the above values and equation, the remaining design life of the disposal facility is estimated to be approximately 30.15 years as of January 1, 2018. The actual life of the facility will vary depending on factors such as population growth, actual disposal rates, types of materials disposed, amount of daily and intermediate cover materials used, the settlement and decomposition of in-place wastes, and the in-place density achieved over the operational life of the facility. A summary of the life and design capacity information is provided in **Table 2**.

**Table 2: Life and Design Capacity Summary**

Current Design Capacity:	6,827,360 cy
Proposed Design Capacity Increase:	13,420,676 cy
Proposed Design Capacity:	20,248,036 cy
Airspace Utilized (as of December 31, 2017):	4,590,305 cy
Remaining Potential Airspace Capacity:	15,657,731 cy
Assumed Daily Cover Utilization:	20 %
Assumed Compacted Density of Waste:	1,000 lb/cy
Assumed Annual Waste Acceptance:	207,719 tons
Remaining Life of Site:	30.15 years

## 2.14 ACCESS ROADS [OAC 252:515-3-36(a)(11)]

The primary access to EQL is from Oklahoma Highway 266 by a private asphalt paved driveway and access road that leads to the facility scale house near the northeastern corner of the site. The access road from the scale house to the landfill is constructed of gravel materials. Traffic to the site is restricted by a lockable gate at the landfill entrance and the scale house. Access roads within the facility are maintained to be passable by normal vehicular traffic as necessary.

## 2.15 AESTHETIC ENHANCEMENT [OAC 252:515-3-37]

OAC 252:515-3-37 requires applications for expansions of an existing permit boundary to include plans to enhance the visual harmony of the expansion area with the surrounding area and reduce the transmission of dust and noise from the facility.

EQL is located within a limestone quarry having a bottom elevation of approximately 100 feet below the surrounding natural grade. The areas surrounding EQL are generally used for heavy industrial activities such as mining and waste disposal, or as pasture land. Due to the location of EQL and the surrounding land uses, it is anticipated that the proposed expansion will have minimal effects on the aesthetics of the area. The EQL site is generally visible to the public from North 129<sup>th</sup> East Avenue and from a short stretch along Oklahoma Highway 266. For this reason, the initial Tier III Permit Application, prepared in July 2001 by Genesis Environmental Consulting, Inc. and Environmental Compliance Services, Inc. (GEC/ECS), proposed the establishment of visual tree buffers along the north and west sides of the site.

View of the site from along Oklahoma Highway 266 is generally blocked by an embankment and trees therefore no additional enhancement is proposed at this time along the northern boundary of the site. The western border of the landfill consists of a quarry highwall with a fence and high voltage powerlines along North 129<sup>th</sup> East Avenue. View of the site along North 129<sup>th</sup> East Avenue is hindered by fencing and vegetation. However, a tree buffer is not feasible along this side due to the presence of the high voltage powerlines and the lack of space between the roadway and the quarry highwall. Therefore, no additional aesthetic enhancement is proposed for the western boundary.

The eastern border is adjacent to a MSWLF facility therefore does not require any additional aesthetic enhancement. The southern border of the permit area is adjacent to an active limestone quarry operated by APAC therefore does not require any additional aesthetic enhancement.

## 2.16 VARIANCE REQUESTS [OAC 252:515-3-32]

This Tier III Permit Modification Application does not include any variance requests.

### 3.0 LOCATION STANDARDS

OAC 252:515-5 establishes location restrictions for all solid waste disposal facilities. The location restrictions pertain to scenic rivers, recreation/preservation areas, endangered or threatened species, 100-year floodplain, public water supply, wellhead protection areas, wetlands, terrace deposits, karst terrain, earthquake epicenter areas, asbestos monofills, utility/transmission lines, fault areas, seismic impact zones, unstable areas, and airports. The following subsections demonstrate compliance with the location restrictions applicable to this facility.

#### 3.1 SCENIC RIVERS [OAC 252:515-5-31(a)]

OAC 252:515-5-31(a) states that no expansion of the permit boundary of an existing solid waste facility shall be located within the drainage basin of any river designated under the Oklahoma Scenic Rivers Act (OSRA) unless a statement is obtained from the Oklahoma Scenic Rivers Commission (OSRC) or the Oklahoma Tourism and Recreation Department stating that the proposed site is not expected to adversely affect the river or any of the public purposes for which it was designated.

The OSRA provides protection for designated Oklahoma scenic rivers including the Illinois River, Lee Creek, Little Lee Creek, Barren Fork Creek, Flint Creek, and the Mountain Fork River. The proposed expansion is within the Bird Creek watershed which is not part of any designated scenic river drainage system.

The OSRC was recently absorbed by the Grand River Dam Authority (GRDA) and now operates as the GRDA Scenic Rivers Operation (SRO). The SRO is now responsible for carrying out the provisions of the OSRA. The SRO was contacted by letter correspondence on January 20, 2017 requesting written confirmation that the proposed expansion is not expected to have any adverse impacts on any of the Oklahoma scenic river areas. SRO provided a written statement, dated January 27, 2017, stating that the "Grand River Dam Authority – Scenic Rivers Operations has no comments on this project(s)." Copies of all correspondence are included in **Appendix D**.

The proposed landfill expansion is not located within the drainage basin of any river designated under the OSRA and the GRDA Scenic Rivers Operation has no comments on the project therefore the proposed expansion is demonstrated to comply with the scenic rivers location restriction.

#### 3.2 RECREATION/PRESERVATION AREAS [OAC 252:515-5-31(b)]

OAC 252:515-5-31(b) states that "no area within the permit boundary of a new solid waste disposal facility, or expansion of the permit boundary of an existing solid waste disposal facility, shall be located within one-half mile of any area formally dedicated and managed for public recreation or natural preservation by a federal, state, or local government agency."

The Tulsa Parks and Recreation Department (TPRD), Oklahoma Archeological Survey (OAS), Bureau of Indian Affairs (BIA), Osage Nation, and the Muscogee Creek Nation were contacted by letter correspondence requesting written confirmation that the proposed expansion is not within one-half

mile of any parks, recreational facilities, and/or sensitive archeological sites. Copies of all correspondence are included in **Appendix D**.

According to the agencies, no parks, recreational facilities, and/or sensitive archeological sites are located within one-half mile of the proposed expansion area. The Redbud Valley Nature Preserve was identified as the nearest such facility and is located at least one-half mile from the eastern boundary of the existing landfill and proposed expansion area as shown in the correspondence.

### 3.3 ENDANGERED OR THREATENED SPECIES [OAC 252:515-5-31(c)]

OAC 252:515-5-31(c) states that “for a new solid waste disposal facility, or expansion of the permit boundary of an existing solid waste disposal facility, a statement from the Oklahoma Department of Wildlife Conservation (ODWC) and from the Oklahoma Biological Survey (OBS), shall be submitted regarding current information about endangered or threatened wildlife or plant species listed in state and federal laws, that exist within one mile of the permit boundary or expansion area.”

OBS was contacted by letter correspondence requesting a written statement regarding current information about threatened or endangered species that may be present within one-mile of the proposed landfill expansion area. OBS noted that one (1) occurrence of the Bald Eagle, a federally protected species, was reportedly observed within Section 9, Township 20 North, Range 14 East in Tulsa County, Oklahoma approximately one-mile north of the proposed expansion area.

ODWC was also contacted through their website for information regarding threatened or endangered species that may be present within one-mile of the proposed landfill expansion area. ODWC reported that there are no known endangered or threatened species critical habitats within or near the proposed expansion area. Copies of all correspondence are included in **Appendix D**.

### 3.4 100-YEAR FLOODPLAIN [OAC 252:515-5-32(a)]

OAC 252:515-5-32(a) states that “no waste management or disposal areas of a solid waste disposal facility shall be located within the 100-year floodplain.” As demonstrated in **Figure 4**, the proposed expansion areas will not be located within the 100-year floodplain.

### 3.5 PUBLIC WATER SUPPLY [OAC 252:515-5-32(b)]

OAC 252:515-5-32(b) states that no new waste management or disposal areas of a solid waste disposal facility shall be located within one-mile upgradient of an existing public water supply surface water intake, or one that is permitted for construction when a complete application has been filed with the DEQ or within a one-year time of travel of a public water supply well.

The Oklahoma Water Resources Board was contacted by letter correspondence requesting written confirmation that the proposed expansion area is not located within one-mile and up-gradient of an existing public water supply surface water intake, or one that is permitted for construction; or within two miles of a public water supply well. OWRB responded by deferring to DEQ for Public Water Supply and Wellhead Protection information. The copies of all correspondence are included in **Appendix D**.

The online DEQ geographic information system (GIS) data viewer was reviewed on April 27, 2018 for public surface water intakes and public water supply wells. The database indicated that there are no public water surface water intakes within one-mile of the proposed expansion area and the proposed expansion area is not within a one-year time of travel of a public water supply well.

### 3.6 WELLHEAD PROTECTION AREA [OAC 252:515-5-32(c)]

OAC 252:515-5-32(c) requires that “if any new waste management or disposal areas will be located within two miles of a public water supply well, a wellhead protection area shall be identified, as specified by the State Wellhead Protection Plan, and such information submitted to the DEQ.”

The online OWRB and DEQ GIS databases were reviewed on April 27, 2018 for public water supply wells within two miles of the proposed expansion area and any identified well head protection areas. The databases indicated that there are no public water supply wells within two-miles of the proposed expansion area or any well head protection areas.

### 3.7 WETLANDS [OAC 252:515-5-31(d)]

OAC 252:515-3-31(d) states that “no new waste management or disposal areas of a solid waste disposal facility shall be located in wetland areas as designated by the Oklahoma Conservation Commission or other appropriate agency.”

A review of available information has not identified any wetlands within the proposed expansion area. The Oklahoma Conservation Commission (OCC) and the U.S. Army Corps of Engineers (USACE) were contacted by letter correspondence requesting written confirmation stating that the proposed site is not located with a wetland as determined by the specific agency. Copies of all correspondence are included in **Appendix D**.

OCC deferred the determination to USACE who stated that the referenced property does not contain any jurisdictional wetlands or other waters of the United States subject to Section 404 of the Clean Water Act (CWA).

### 3.8 TERRACE DEPOSITS [OAC 252:515-5-51(a)]

OAC 252:515-5-51(a) states that “no area within the permit boundary of a new land disposal facility, or expansion of the permit boundary of an existing land disposal facility, shall be located within an area designated as alluvium or terrace deposits and their recharge areas, as shown on the "Map of Aquifers and Recharge Areas in Oklahoma" compiled by Kenneth S. Johnson, Oklahoma Geological Survey (1991).”

As demonstrated in **Figure 5**, the proposed expansion areas will not be located in an area designated as alluvium or terrace deposits and their recharge areas.



### 3.9 KARST TERRAIN [OAC 252:515-5-51(b)]

OAC 252:515-5-51(b) states that “no area within the permit boundary of a new MSWLF shall be in a location that is both within a locally fractured or cavernous limestone or cherty limestone bedrock and within five-miles of any water well owned by a rural water district that is used or has the potential to be used to provide water to customers of the district.”

Although this location restriction does not apply to C&D landfills, EQL is not located within a locally fractured or cavernous limestone or cherty limestone bedrock

### 3.10 EARTHQUAKE EPICENTER AREAS [OAC 252:515-5-51(c)]

OAC 252:515-5-51(c) states that “no area within the permit boundary of a new land disposal facility accepting NHIW shall be located within five miles of a known epicenter of an earthquake of more than 4.0 on the Richter Scale, or a number V on the modified Mercalli Scale, as recorded by the Oklahoma Geological Survey (OGS).

EQL is an existing facility that does not generally accept NHIW therefore this location restriction does not apply. However, after review of the OGS online Earthquake Catalog on April 17, 2018, it does not appear that EQL is located within five miles of a known epicenter of an earthquake of more than 4.0 on the Richter Scale, or a number V on the modified Mercalli Scale, as recorded by OGS.

### 3.11 UTILITY/TRANSMISSION LINES [OAC 252:515-5-52(a)]

OAC 252:515-5-52(a) states that “a minimum horizontal separation of twenty-five feet (25') shall be maintained between all waste management and disposal areas of a land disposal facility and any above-ground or underground pipeline or transmission line. Information on the locations and owners of all such lines and easements shall be provided to the DEQ.”

There are no known underground or aboveground pipelines or other transmission lines within 25 feet of the proposed lateral expansion area.

### 3.12 FAULT AREAS [OAC 252:515-5-52(b)]

OAC 252:515-5-52(b) states that “no new waste management or disposal areas of a land disposal facility shall be located within 200 feet of a fault that has had displacement in Holocene time” unless certain demonstrations can be made.

**Figure 6** depicts mapped surface and subsurface faults in the region and illustrates the absence of faults in the immediate vicinity of the site. The faults depicted on this map are based on the most recent version of the Oklahoma Fault Database (Open File Report OF2-2016 dated May 2016) which is updated as additional fault information becomes available and is therefore considered “preliminary”. As shown in **Figure 6**, the facility and the proposed lateral expansion area is not located within 200 feet of a Holocene aged fault or a mapped major fault. The closest fault is located approximately 12.6 miles from the site.

### 3.13 SEISMIC IMPACT ZONES [OAC 252:515-5-52(c)]

OAC 252:515-5-52(b) states that “no new waste management or disposal areas of a land disposal facility shall be located in a seismic impact zone.” A seismic impact zone is defined in OAC 252:515-1-2 as “an area with a ten percent or greater probability that the maximum horizontal acceleration in lithified earth material, expressed as a percentage of the earth's gravitational pull (g), will exceed 0.10g in two hundred fifty (250) years.”

**Figure 7** presents the U.S. Geological Survey (USGS) Seismic-Hazard Maps for the Conterminous United States, dated 2015, for the area in Oklahoma which the EQL lateral expansion is proposed. The USGS map provides a peak horizontal acceleration (PGA) expressed as a percent of gravity (%g), with a 2% probability of exceedance within 50 years. According to the USGS, the 2% probability of exceedance within 50 years is statistically equivalent to the 10% exceedance within 250 years. As shown in **Figure 7**, the PGA expressed as a percentage of gravity is approximately 6% (0.06g) for the location of the proposed expansion. Therefore, the proposed expansion is demonstrated to comply with the seismic impact zones location restriction.

### 3.14 UNSTABLE AREAS [OAC 252:515-5-52(d)]

OAC 252:515-5-52(d) states “no new waste management or disposal areas of a land disposal facility shall be located over a subsurface mining area or any other unstable area.”

The proposed expansion area is within a surface limestone quarry where all soil overburden has been removed and the majority of limestone rock has been mined down to the underlying shale therefore significant differential settlement is not expected. The existing landfill and proposed expansion area are not located over a subsurface mining area or in an area considered to be unstable.

### 3.15 AIRPORTS [OAC 252:515-5-52(e)]

OAC 252:515-5-52(e) states that “if any waste management or disposal area of a new land disposal facility, or expansion of waste management or disposal areas of an existing land disposal facility, is to be located within 10,000 feet of any airport runway end used by turbojet aircraft or within 5,000 feet of any airport runway end used by only piston-type aircraft, a demonstration that the facility will not pose a bird hazard to aircraft shall be provided to the DEQ.” It is further required that “if any waste management or disposal areas of a new land disposal facility, or expansion of waste management or disposal areas of an active land disposal facility, will be located within a 5-mile radius of any airport runway end used by turbojet or piston-type aircraft, the affected airport and the FAA must be notified, and proof of such notification provided to the DEQ.”

OAC 252:515-5-52(e)(2) states that C&D landfills are exempt from the airport location restriction however this item is addressed herein due to the proximity of the proposed expansion to nearby airports and a MSWLF, and also in consideration of FAA Advisory Circular 150-5200-33B.

As shown in **Figure 8**, the proposed landfill expansion area is located at a distance greater than 5,000 feet from the nearest runway end used by piston-powered aircraft and greater than 10,000 feet from the nearest runway end used by turbine-powered aircraft.

However, the proposed expansion area is located within 5 statute miles of the nearest runway end of the Tulsa International Airport (TUL), Harvey Young Airport (1H6) and Gundy's Airport (O38). Tulsa International Airport is located approximately 2.5 miles to the southwest of the proposed expansion area, Harvey Young Airport is located approximately 5 miles to the south of the proposed expansion area, and Gundy's Airport is located approximately 4 miles to the northeast of the proposed expansion area. In accordance with FAA Advisory Circular 150-5200-33B, a separate notification letter was sent to each of these airports and the FAA. FAA provided a written statement, dated February 7, 2017, stating that the FAA has no objections to the expansion plans. No comment was received from the notified airports. Copies of all correspondence are included in **Appendix D**.

The proposed expansion of EQL is not expected to pose an increased wildlife hazard to aircraft utilizing nearby airports. Putrescible wastes are not accepted at EQL and APAC consistently maintains a manageable active working face that is compacted and covered with earthen material or a DEQ approved alternate cover material at least on a weekly basis. The application of such cover materials minimizes the exposure of waste materials that could potentially serve as a wildlife habitat. Furthermore, the present quarry area is largely devoid of vegetation that would provide habitat for wildlife.

## 4.0 SUBSURFACE INVESTIGATION [OAC 252:515-7]

A subsurface investigation must be completed in accordance with OAC 252:515-7 prior to submitting a permit application for a new land disposal facility or for an expansion of waste disposal boundaries of an existing land disposal facility.

A detailed subsurface investigation and groundwater study was previously performed by GEC/ECS in 2001 for the initial permitting of EQL. A subsurface investigation for the proposed 55.76-acre lateral expansion area was recently performed in 2016 through 2017. The areas of investigation included a regional hydrogeologic study, site specific hydrogeologic study, and groundwater study. Field activities included surface reconnaissance and mapping of the site and surrounding area, development and implementation of a Drilling Plan which included the installation of eleven (11) borings and five (5) piezometers, a subsurface geophysical study, a local water well inventory, and hydrogeologic analysis of groundwater conditions at the site.

A&M Engineering and Environmental Services, Inc. (A&M) conducted the field and data collection activities for the subsurface investigation and groundwater study in accordance with OAC 252:515-7. A Subsurface Investigation and Groundwater Study Report was prepared by E&E Engineering and Associates, LLC (E&E) based on the subsurface investigation and groundwater study data and information provided by APAC.

The Subsurface Investigation and Groundwater Study Report, provided as **Appendix E**, documents the field activities performed, data collected, and conclusions developed. The results of both subsurface investigations were considered while designing the proposed lateral expansion. The local geology, groundwater characteristics, proposed groundwater monitoring system, surface penetration plugging information, and the proposed groundwater monitoring program discussed in the Subsurface Investigation and Groundwater Study Report are summarized in the following subsections.

### 4.1 GEOLOGIC SETTING

The proposed EQL lateral expansion site is located in an area normally underlain by the Pennsylvanian Age Oologah Formation; however, the majority of this formation has been removed by past mining operations. The Oologah Formation has also been mined extensively just north of the existing landfill across Oklahoma Highway 266. The Oologah Formation, which consists of the Altamont Limestone, Bandera Shale, and Pawnee Limestone, comprises the sidewalls of the quarry pit where EQL is located. A Surface Geology Map and a regional Geologic Cross-Section Map of the area is provided as **Figure 9**.

The quarry site can be described as a large pit with some steep to nearly vertical side-walls along the northern and western property boundary. The difference in elevation between the original ground surface and the bottom of the quarry floor is over 100 feet in places. Mining operations within the proposed expansion area have been completed and the area currently consists of unmarketable rock materials, mining spoil materials, and exposed Labette Shale which underlies the Oologah Formation. The Labette Shale is documented in literature to be over 200 feet thick in the vicinity of the site. Surface drainage across the quarry site is generally to the northwest towards the existing quarry storm water impoundments which lie west and northwest of the existing landfill.

## 4.2 GROUNDWATER

During this Subsurface Investigation and Groundwater Study five (5) piezometers were installed at the site to depths ranging from approximately 15.0 to 89.0 feet below ground surface. The piezometers and existing groundwater monitoring wells were utilized to gather data over a 13-month period regarding the hydrogeologic characteristics of the uppermost aquifer underlying the site.

Groundwater at the site is generally encountered at the contact between the Oologah Formation and the Labette Formation or within the upper portion of the Labette Formation. Groundwater flow across the site was generally observed to be from east to west. Aquifer testing indicates that the uppermost aquifer in the proposed expansion area exhibits an average hydraulic conductivity of  $7.17 \times 10^{-4}$  cm/sec. The highest average groundwater elevation across the site during the 13-month monitoring period was observed on May 1, 2017 in response to a significant rainfall event. The hydraulic gradient at this time was estimated to be 0.0140 feet per foot (ft/ft) and the estimated linear velocity of groundwater flow through the bedrock aquifer was estimated to be  $2.23 \times 10^{-4}$  cm/sec or 230.73 ft/year.

## 4.3 PROPOSED MONITORING SYSTEM

The existing groundwater monitoring system at EQL consists of four (4) monitor wells identified as MW-2, MW-3, MW-6, and MW-7A. MW-7A is designated as the up-gradient background well while MW-2, MW-3 and MW-6 are designated as down-gradient compliance wells.

During the subsurface investigation a total of three (3) piezometers were planned for installation which were to be designated as PZ-8, PZ-9, and PZ-10. After installation, PZ-10 failed to recover properly after initial purging therefore a replacement piezometer designated as PZ-11 was installed near PZ-10. PZ-11 similarly failed to recharge after initial purging. As a result, another replacement piezometer designated as PZ-12 was installed approximately 470 feet north of PZ-10. PZ-12 was properly developed and served as the third viable piezometer for the groundwater study. All of the piezometers were originally constructed such that they could subsequently be converted into groundwater monitoring wells if needed.

Based upon the hydrogeology of the site and the anticipated configuration of the landfill, it is proposed that piezometer PZ-8 and PZ-12 be converted into monitoring wells MW-8 and MW-9 respectively. It is proposed that MW-7A and MW-9 serve as up-gradient wells while MW-2, MW-6, and MW-8 serve as down-gradient wells. The proposed groundwater monitoring system is depicted in **Figure 10** and in the Permit Drawings.

Based upon the lack of water and aquifer response observed in PZ-10 and PZ-11, it is proposed that these piezometers are plugged and abandoned. Due to the volume of stormwater drainage currently impacting MW-3 and the resulting maintenance issues created, it is proposed that MW-3 also be plugged and abandoned. It is believed that the remaining down-gradient wells will provide adequate characterization of down-gradient groundwater conditions therefore it is also proposed that PZ-9 be plugged and abandoned. MW-2 and MW-6 are currently located within the proposed Phase 4 development area therefore they will need to be relocated further to the west prior to the development of that area.

The design and construction details of the piezometers and proposed monitoring wells are provided in **Appendix E**. All piezometers and monitoring wells that are no longer required will be plugged in accordance with OAC 252:515-7-71 and OWRB regulations. EQL will provide at least two (2) weeks written notice to DEQ prior to initiating monitoring well drilling and installation activities. Groundwater monitoring wells will be constructed in accordance with the requirements of the OWRB. As-built drawings of new groundwater monitoring wells will be submitted to DEQ within 90 days of the installation.

#### 4.4 PROPOSED MONITORING PROGRAM

The monitoring program will follow the updated Groundwater Sampling and Analysis Plan (GWSAP) provided in **Appendix F**. Upon approval and installation of the groundwater monitoring system, APAC will begin collecting background samples from the new monitoring wells on a quarterly basis until eight (8) sets of background samples are obtained. After sufficient background samples are collected detection monitoring will continue for these wells consistent with the remainder of the monitor wells on-site.

## 5.0 METHANE GAS MONITORING [OAC 252:515-15]

OAC 252:515-15-2 establishes standards and requirements for controlling explosive gas associated with land disposal facilities that receive waste with the potential to generate explosive gases. The concentration of methane gas generated by the facility shall not exceed:

1. twenty-five percent (25%) of the lower explosive limit (LEL) for methane in all structures within the permit boundary (excluding gas control or recovery system components); and
2. the LEL for methane at the permit boundary.

Explosive gas monitoring shall be performed in accordance with an approved plan at least once per quarter. Gas probes shall be installed at locations no more than 1,000 feet apart along the permit boundary to allow for monitoring around the perimeter of the facility. Gas monitoring probes shall be installed to a minimum depth equivalent to the deepest placement of waste and be screened for the entire depth of waste.

EQL currently implements a Landfill Gas Management Plan which requires the quarterly monitoring of seven (7) gas monitoring probes designated as GP-1, GP-2, GP-3, GP-4, GP-5, GP-6, and GP-7. In order to continue to comply with OAC 252:515-15-2, it is proposed that GP-3, GP-4, GP-5, and GP-6 ultimately be relocated outside of the proposed waste disposal area and three (3) additional gas probes designated as GP-8, GP-9, and GP-10 be installed to allow for the performance of perimeter explosive gas monitoring.

When gas probes are removed from service they will be plugged in accordance with OAC 252:515-7-71 and OWRB regulations. Within 90 days of installation, as-built drawings of new probes shall be submitted to DEQ to demonstrate that the probes were installed in accordance with OAC 252:515-15-4. New gas monitoring probes shall be constructed in general accordance with the details provided in the updated Landfill Gas Management Plan which is included in **Appendix G**. The locations of the proposed gas probes are shown in **Figure 10**, the Permit Drawings, and in the updated Landfill Gas Management Plan.

## 6.0 STORMWATER MANAGEMENT [OAC 252:515-17]

OAC 252:515-17 establishes standards and requirements for the management of stormwater associated with solid waste disposal operations. Solid waste disposal facilities must incorporate a run-on control system in the facility design capable of preventing flow onto the active portion of the site during the peak discharge from a 24-hour, 25-year storm. In addition, the design should include provisions to collect and control the run-off water volume from the active landfill resulting from a 24-hour, 25-year storm. Furthermore, the facility should be designed to prevent the discharge of pollutants into the waters of the State or waters of the United States.

EQL is located within a limestone quarry with base elevations up to 100 feet below the surrounding ground surface. Run-on into the quarry is minimal. The quarry floor is generally sloped to drain to the northwest corner of the quarry floor where the existing stormwater impoundments F01 and F03 are situated. Since before the establishment of EQL, APAC has utilized the stormwater collected in F01 and F03 as a source of water to satisfy the demands of their quarry and asphalt production operations. Most of the water is recycled for use as makeup water. Storage of stormwater run-off for use as make-up water is necessary and critical to APAC's other operations. During periods of high rainfall, excess water entering the stormwater system is discharged to Bird Creek in accordance with the facility OPDES permit through the permitted outfall located north of the landfill site.

This section provides information regarding the run-on and run-off controls provided by the permit design and measures implemented to prevent the discharge of pollutants into the waters of the United States.

### 6.1 RUN-ON CONTROL SYSTEM [OAC 252:515-17-2(a)]

In accordance with OAC 252:515-17-2(a), EQL has been designed with a run-on control system to prevent the flow of stormwater onto active portions of the facility during the peak discharge from a 24-hour, 25-year storm event.

Perimeter run-on/run-off ditches will divert run-on away from waste disposal areas. Stormwater diversion swales and berms will be constructed as necessary on the final or intermediate cover systems and around the perimeter of the waste disposal areas as required during operation and development of the facility in order to prevent stormwater run-on to the active waste disposal areas. Disposal operations will include measures to minimize the amount of stormwater that enters any active disposal areas through the use of diversion berms and ditches. Stormwater will be diverted to stormwater impoundments F01 and F03. The overall stormwater management system will be constructed and implemented as site development progresses as discussed in the Stormwater Management Plan provided in **Appendix H**. The expansion of EQL is not anticipated to significantly alter the general site drainage patterns.

### 6.2 RUN-OFF CONTROL SYSTEM [OAC 252:515-17-2(b)]

In accordance with OAC 252:515-17-2(b), EQL has been designed with a run-off control system with sufficient capacity to collect and control all stormwater resulting from a 24-hour, 25-year storm event. Drainage swales and letdown channels will convey stormwater run-off from the final cover to perimeter



run-off ditches and then to one of the two stormwater impoundments. Run-off from the active working face will generally be contained within the waste disposal area.

Drainage calculations were performed assuming a 24-hour, 25-year storm precipitation of 6.79 inches to verify that the typical diversion swales, letdown channels, and perimeter run-on/run-off ditches will control the peak flows resulting from a 24-hour, 25-year storm. The proposed impoundment system will also provide sufficient storage capacity to contain run-on and run-off from a 24-hour, 25-year storm. The drainage calculations are provided in **Appendix H**.

### 6.3 DISCHARGES AND SURFACE WATER PROTECTION [OAC 252:515-17-3]

EQL operates in a manner that prevents the discharge of pollutants into waters of the United States that may violate the requirements of the federal CWA, including but not limited to the OPDES requirements. Stormwater discharges associated with EQL are covered under the current East Quarry OPDES discharge permit which is provided in **Appendix I**. A copy of the facility Stormwater Pollution Prevention Plan (SWP3) is also provided in **Appendix I**.

## 7.0 LINER AND FINAL COVER SYSTEMS

Bottom liner and final cover systems for EQL shall be constructed in accordance with OAC 252:515-11, Part 3 and OAC 252:515-19-53 respectively. The proposed bottom liner and final cover design is provided in the Permit Drawings. This section provides information regarding the quality assurance (QA) / quality control (QC) requirements for liner and final cover system construction; bottom liner design and installation; and final cover system design and installation.

### 7.1 QUALITY ASSURANCE / QUALITY CONTROL [OAC 252:515-11-4]

OAC 252:515-11-4 requires a QA/QC plan to be prepared and implemented to demonstrate that liner systems are installed in accordance with OAC 252:515-11 and the approved design drawings. The QA/QC plan must contain the information presented on pages 1 through 173, inclusive, of EPA Technical Guidance Document: Quality Assurance and Quality Control for Waste Containment Facilities (EPA/600/R-93/182), September, 1993.

The existing QA/QC plan has been updated to comply with current applicable requirements and this permit modification application. The updated QA/QC Plan is provided in **Appendix J** and includes information required for the applicable liner design, placement, construction, and testing.

Prior to the construction of future disposal cells, APAC will review the QA/QC Plan and, if necessary, revise the plan to ensure liner design and construction is in accordance with the minimum requirements of OAC 252:515-11. QA and QC will be conducted during all phases of construction of the liner and final cover systems. A qualified third-party construction QA consultant will conduct QA and be present during each phase of liner construction.

### 7.2 BOTTOM LINER DESIGN AND INSTALLATION [OAC 252:515-11-31]

The bottom liner system for EQL will consist of a reconstructed clay liner system and an earthen protective cover layer. The clay liner will be at least 36-inches in thickness and will have a hydraulic conductivity no greater than  $1.0 \times 10^{-5}$  cm/sec. Soil used to construct the reconstructed clay liner shall meet or exceed the following standards:

- Plasticity index (ASTM D4318). Plasticity index (PI) shall be greater than or equal to 10%.
- Liquid limit (ASTM D4318). Liquid limit (LL) shall be greater than or equal to 24%.
- Percent fines (ASTM D422). Percent fines passing #200 mesh sieve shall be greater than or equal to 30%.
- Gravel amount (ASTM D422). The amount of gravel (dry-weight percentage retained on the No. 4 sieve) shall be less than or equal to 20%.
- Particle size. Particle size shall be less than one-inch in diameter.
- Water content. After the soil is compacted, the water content of the soil shall be equal to or greater than optimum.
- Soil density. After the soil is compacted, the minimum density of the soil shall be greater than or equal to:
  - 95% of the standard proctor density (ASTM D698); or
  - 90% of the modified proctor density (ASTM D1557).

The clay liner material shall be placed in uniform loose lifts not exceeding 9-inches, moisture conditioned, and compacted to provide a compacted lift thickness of approximately 6-inches. All lifts shall be compacted to at least 95% of the maximum dry density as determined by ASTM D698 at a moisture content equal to or greater than the optimum moisture content as necessary to achieve a maximum hydraulic conductivity of  $1.0 \times 10^{-5}$  cm/sec. The soil moisture content shall be maintained above the optimum moisture content until the protective cover layer is placed.

The protective cover layer shall be a minimum of twelve (12) inches in thickness and shall consist of clean earthen material. The largest particle size allowed shall be less than 4-inches in diameter. The protective cover layer shall be placed as soon as possible after the clay liner is completed. The protective cover layer is designed and intended to protect the clay liner from damage, desiccation, and deterioration prior to and after waste placement.

The top of clay grades for the bottom liner system are shown on **Sheet 5** of the Permit Drawings. Generally, the bottom liner system will be graded to drain in a westerly direction at a minimum grade of 0.5%. The bottom liner system shall extend across the base of the landfill and up the 3:1 interior side slopes associated with the perimeter berm as shown on **Sheet 14** of the Permit Drawings.

During the installation of the bottom liner system, the construction methods and material consistency will be monitored, tested, and documented in accordance with the updated QA/QC Plan which is provided in **Appendix J**.

### 7.3 FINAL COVER DESIGN AND INSTALLATION [OAC 252:515-11]

The final cover system for EQL will include a compacted earthen barrier layer overlain by an erosion layer. The barrier layer will be at least 24-inches in thickness with a hydraulic conductivity no greater than  $1.0 \times 10^{-5}$  cm/sec and will be constructed in accordance with the following minimum standards:

- The final cover material shall be free of garbage, trash, or other unsuitable material;
- The largest particle size allowed shall be less than 2-inches in diameter;
- Earthen material shall be compacted in lifts that do not exceed 9-inches in a loose condition and/or 6-inches in a compacted condition; and
- Lifts shall be moisture conditioned and compacted to the extent possible to achieve a minimum in-place density of 95% of the soil maximum dry density based on as standard proctor analysis.

The erosion layer shall be a minimum of twelve (12) inches in thickness and shall be placed as soon as possible after the barrier layer is completed. Material to be used for the erosion layer will be of sufficient quality to support vegetative growth. Soil enhancers (i.e., lime, fertilizer, etc.) are to be applied as needed and if required.

The final grading plan associated with the C&D waste disposal area is illustrated on **Sheet 7** of the Permit Drawings. Generally, the final cover system will be graded to drain at a minimum slope of 4% and a maximum slope of 25%. The top of the 4:1 slopes will be constructed to an elevation that generally does not exceed 800 ft msl. The maximum height of the C&D landfill grading plan will generally not exceed 807 ft msl.

The design of the final cover system includes provisions for drainage swales and stormwater letdown channels. The drainage swales and letdown channels will assist in managing and controlling stormwater run-off associated with the final cover system while minimizing the potential for erosion. The drainage swales will generally be at least 30-inches in height. The letdown channels will consist of an 8-foot wide trapezoidal channel that is at least 24-inches deep. The letdown structure will be lined with a geotextile filter fabric/rip-rap, concrete revetment, or equivalent high velocity channel lining material. At the owner's discretion, the trapezoidal channel may be replaced with below grade piping (HDPE, CMP, or RCP) with flow carrying capacity that meets or exceeds that of the trapezoidal channel.

As discussed in the facility Closure Plan, final cover will be placed in stages as the fill progresses and areas reach the design elevations. During the installation of the final cover system, the construction methods and material consistency will be monitored, tested, and documented in accordance with the facility QA/QC Plan.

## 8.0 LEACHATE MANAGEMENT [OAC 252:515-13]

EQL is required to manage leachate in accordance with Part 5 of OAC 252:515-13, which provides alternatives to manage and control leachate including storage, recirculation, irrigation, disposal at a publicly owned treatment works (POTW), and discharge authorized by an OPDES permit.

APAC maintains an OPDES permit which authorizes the discharge of stormwater from quarry operations, quarry process wastewater, and C&D landfill related stormwater and leachate. Leachate and stormwater run-off associated with active waste disposal areas will be managed within the cell. Specifically, each cell will be graded to drain to one end of the cell (west end). Leachate/stormwater that accumulates within a cell will then be pumped or diverted via gravity to the impoundments located west and northwest of the disposal area. Stormwater run-off from both the quarry and landfill, quarry process wastewater, and leachate that accumulates in the impoundments may then be either recycled by the quarry and asphalt operations or discharged via the OPDES permitted outfall located north of the facility, provided that all discharge standards established in the OPDES Permit are met. Discharges are infrequent occurrences at the site as a significant amount of water is needed and is used in support of existing quarry and rock/asphalt processing operations. Water and leachate from the impoundments may also be used to water grass and control dust at the landfill site.

If the leachate is found to contain elevated concentrations of certain constituents as defined by the OPDES Permit, the leachate may be pumped from an active cell to an on-site treatment area prior to release into the impoundments. If on-site treatment proves impractical, the leachate may be loaded on a tanker truck and transported to a wastewater treatment plant for treatment/disposal.

## 9.0 OPERATIONAL REQUIREMENTS

Operational requirements for this facility are outlined in OAC 252:515-19 Parts 3 and 5. The landfill Operating Plan (OP) addresses the operational requirements and is intended to provide a reference and directive for operating and maintaining the landfill facility. The landfill OP is included in **Appendix K** and has been updated to reflect current operations and regulations. This section summarizes the operational procedures and requirements specifically outlined by DEQ.

### 9.1 PROHIBITED WASTE [OAC 252:515-19-31]

In accordance with OAC 252:515-19-31(3), EQL only accepts and disposes of C&D waste. Acceptance of the following materials is specifically prohibited at EQL:

- Hazardous, radioactive, or regulated polychlorinated biphenyl (PCB) waste;
- Regulated medical waste;
- Friable asbestos;
- Non-hazardous industrial solid waste (NHIW), unless approved by DEQ;
- Municipal solid waste; and
- Special wastes, except tires, unless approved by DEQ.

Detailed information on acceptable and unacceptable wastes; screening procedures; recordkeeping and reporting requirements; and training requirements associated with waste acceptance at the site is detailed in the facility's approved Waste Exclusion Plan (WEP). A copy of the approved WEP is included as **Appendix L**.

### 9.2 PUBLIC ACCESS CONTROL [OAC 252:515-19-32]

OAC 252:515-19-32 states that artificial and/or natural barriers shall be used to discourage unauthorized traffic and uncontrolled dumping.

A combination of artificial and natural barriers discourages unauthorized traffic and uncontrolled dumping at the facility. The main entrance located on the south side of Oklahoma Highway 266 is gated, and public access is controlled at the nearby scale house / entrance facility. Fencing is present around most of the APAC property and natural barriers include steep excavations and highwalls resulting from previous mining operations.

### 9.3 MEASURING WASTE [OAC 252:515-19-33]

OAC 252:515-19-33 requires that all waste delivered to and disposed of at a landfill facility be weighed on certified scales. The testing and certification of the scales shall be conducted annually in accordance with the Oklahoma Department of Agriculture, Food, and Forestry (ODAFF) requirements. If the scale is inoperative, tonnage shall be estimated on a volume basis where one cubic yard of waste shall be calculated to weigh one-third (1/3) ton. Fees and monthly reports are to be submitted to DEQ and filed in the operating record. Copies of submitted forms should be maintained in the facility operating record.

The scales at EQL are located approximately one-quarter of a mile from the main entrance on the north side of the landfill. All waste loads arriving at the facility must first be checked and weighed at the scale house. Scales are maintained and certified in accordance with applicable requirements. APAC documents and records the weight, either directly measured or estimated on a volume basis, of all waste delivered to the facility and the required fees are remitted to DEQ.

#### 9.4 LIMITATIONS ON WASTE RECEIVED [OAC 252:515-19-34]

OAC 252:515-19-34 provides guidelines on the volume of waste that may be either accepted locally or from out-of-state.

EQL is permitted to accept more than 200 tons of waste per day from locations more than 50 miles from the facility since it is a solid waste disposal facility that is designed and constructed in accordance with the requirements of OAC 252:515-19 and is operated in full compliance with the requirements of OAC 252:515-19.

However, EQL is not permitted to accept more than 200 tons of waste per day from outside the state of Oklahoma since the facility is neither constructed with composite liner and leachate collection system or is a non-landfill solid waste disposal facility. EQL is not required to maintain a Disposal Plan.

#### 9.5 LITTER CONTROL [OAC 252:515-19-35]

OAC 252:515-19-35 requires approach roadways within one-half mile of EQL to be kept clean from litter and states that blowing litter shall be controlled by:

- providing litter fences near the working area or by use of a design that prevents blowing litter;
- ensuring that unloading occurs in a manner that will minimize scattering of refuse;
- posting signage that will advise customers to adequately cover their loads to prevent blowing litter; and
- collecting litter from the site at least weekly, or more often than necessary.

Litter migration from the working face should be minimized due to the low profile of the site, as it is generally below the surrounding natural grade, as well as the nature and type of waste disposed. Blowing litter will be controlled in accordance with OAC 252:515-19-35 and the OP.

All incoming waste transport vehicles will be checked at the landfill scale facility to ensure that all waste loads are properly covered. The active disposal areas will be covered with 6-inches of compacted earthen material every seven days or as needed to prevent scattering of waste materials. If litter fences are needed they will be established as close to daily operations as possible without interfering with routine operations. Litter fences will consist of a portable commercial fencing material moved into place depending on wind conditions. Based on the nature and type of waste disposed, litter fencing will generally not be needed. APAC personnel will monitor the landfill site and access roads within ½ mile of the site for litter on a weekly basis. Litter crews will be deployed on a more frequent basis as needed and required to keep the landfill area neat and orderly.

## 9.6 AIR CRITERIA [OAC 252:515-19-36]

OAC 252:515-19-36 requires EQL to control dust, comply with the Clean Air Act, and prohibits burning of solid waste.

EQL will be operated to prevent the discharge of visible fugitive dust emissions beyond the property boundaries. Fugitive dust emissions is not expected to damage or interfere with the use of adjacent properties, or cause air quality standards to be exceeded. EQL will spray haul roads using a water truck, as needed, when the facility is in operation. Open burning of solid waste at EQL is prohibited.

## 9.7 DISEASE VECTOR CONTROL [OAC 252:515-19-37]

OAC 252:515-19-37 states that on-site populations of disease vectors shall be controlled using techniques appropriate for the protection of human health and the environment, however a disposal facility receiving only non-putrescible solid waste is not subject to this requirement.

EQL is permitted to only receive C&D waste materials. Due to the nature of the waste stream, the potential for disease vectors is minimized. Special controls or handling procedures are not required to prevent disease vectors. The application of weekly, intermediate, and final cover will aid in the prevention and control of any potential disease vectors.

## 9.8 PLACEMENT OF WASTE [OAC 252:515-19-38]

In accordance with OAC 252:515-19-38(a) and the OP, no waste will be placed or allowed to enter waters that communicate with waters of the State located outside the permit boundary. The permit design provides waste-free buffer zones of at least 50-feet in width between all waste disposal and/or handling areas and adjacent property in accordance with OAC 252:515-19-38(c). Buffer zones are within the limits of the facility permit boundary identified in the Permit Drawings.

## 9.9 SALVAGE AND RECYCLING [OAC 252:515-19-39]

In accordance with OAC 252:515-19-39, EQL is currently conducting recycling operations in accordance with an approved Recycling Plan dated March 26, 2012. Materials approved for recycling at EQL include metals, asphalt shingles, and wood pallets. A designated area adjacent to the scale house is used to store recyclable material until it can be transported to a recycling contractor. A copy of the approved Recycling Plan is provided as **Appendix M**.

## 9.10 RECORDKEEPING AND REPORTING [OAC 252:515-19-40]

In accordance with OAC 252:515-19-40, the operating record of the facility will be maintained on-site or near the facility. The operating record will contain all records concerning the planning, construction, operation, closing, and post-closure monitoring of the facility.



### 9.11 SLOPE LIMITS [OAC 252:515-19-50]

In accordance with OAC 252:515-19-50 the following slope limits will be complied with:

- The interior slopes of a waste disposal area will be no steeper overall than 3 horizontal to 1 vertical (3:1) at any time when it adjoins an area within the permitted boundary proposed to accept waste;
- The exterior slope of a waste disposal area shall be no steeper overall than 4:1 at any time when located at the limits of the permitted boundary or adjoining area not proposed to accept waste; and
- The slope of the working face may vary during daily placement of waste but shall be graded to meet applicable slope requirements described above at the end of each operating day.

The Permit Drawings have been prepared in compliance with these requirements.

### 9.12 DAILY COVER [OAC 252:515-19-51]

Daily cover at EQL shall be applied a minimum of once every seven (7) days in accordance with OAC 252:515-19-51. More frequent application may be required for adequate control of disease vectors, fires, odors, blowing litter, or scavenging. Daily cover shall consist of at least six (6) inches of compacted earthen material. DEQ may approve the use of an alternative daily cover (ADC) upon a demonstration the alternative is capable of controlling disease vectors, fires, odors, and blowing litter without presenting a threat to human health or the environment.

### 9.13 INTERMEDIATE COVER [OAC 252:515-19-52]

Intermediate cover shall be applied to inactive areas of the landfill that are not protected by final cover in accordance with OAC 252:515-19-52. The intermediate cover shall consist of 12-inches of compacted earthen materials that are free of garbage, trash, or other unsuitable material. DEQ may approve the use of an alternative intermediate cover upon a demonstration the alternative is capable of minimizing infiltration of water, can sustain vegetation and is considered to be waste free.

### 9.14 FINAL COVER [OAC 252:515-19-53]

When the landfill has reached final waste elevations, the final cover system will be constructed in accordance with OAC 252:515-19-53 and the approved Closure Plan. The final cover system will consist of a 24-inch thick barrier layer with a hydraulic conductivity no greater than  $1 \times 10^{-5}$  cm/sec and a 12-inch thick erosion layer capable of sustaining plant growth.

### 9.15 VEGETATIVE COVER [OAC 252:515-19-54]

Permanent and interim vegetative cover will be established in accordance with OAC 252:515-19-54 and the existing Vegetation Management Plan provided as **Appendix N**.

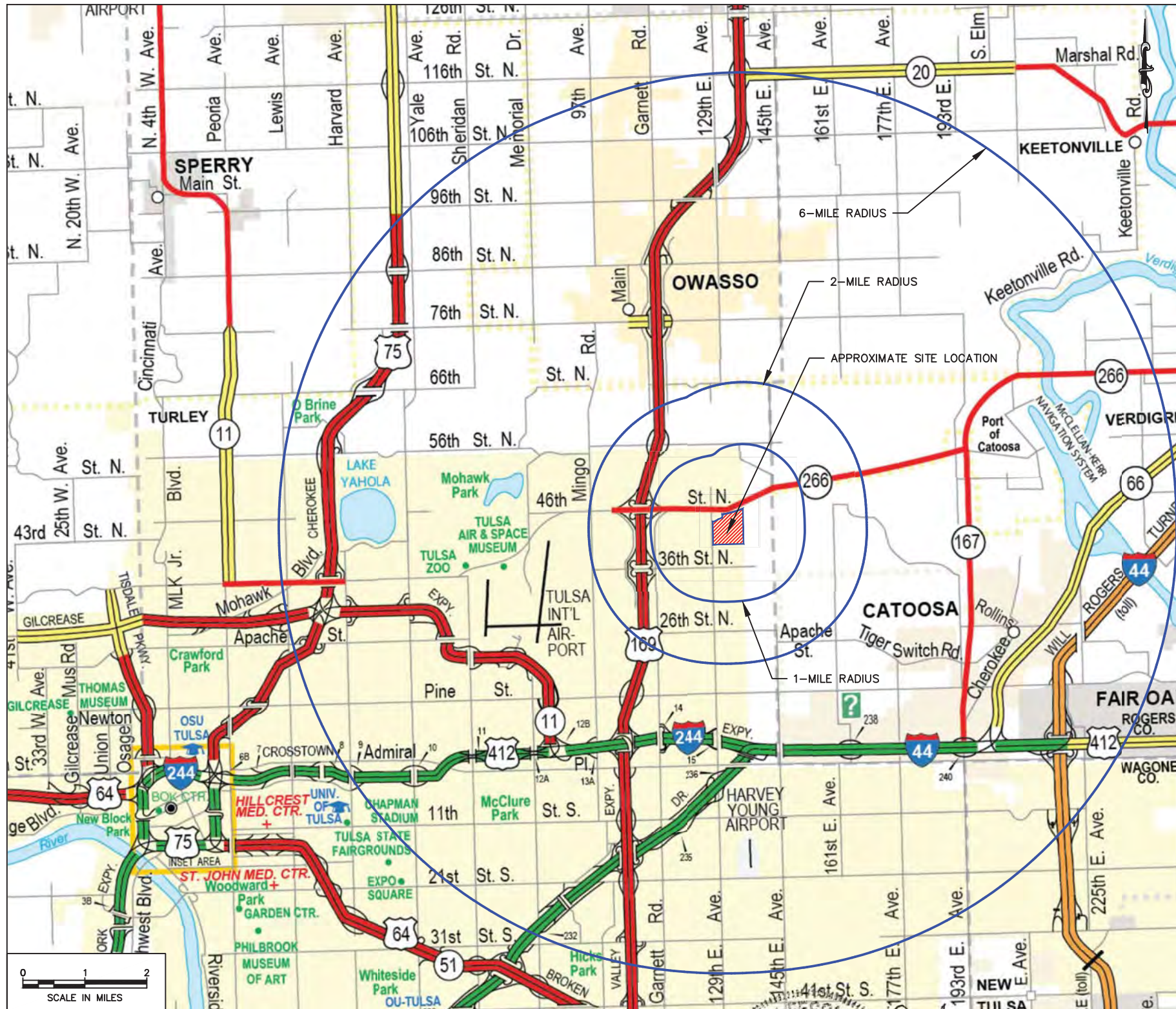
### 9.16 SOIL BORROW AREAS [OAC 252:515-19-55]

On-site and off-site soil borrow areas which are no longer to be used to obtain soil shall be reshaped and revegetated, or otherwise reclaimed, to blend with surrounding terrain within 180 days of the date the area ceased being used in accordance with OAC 252:515-19-55.

## 10.0 CLOSURE AND POST-CLOSURE PLANS

Updated closure and post-closure plans are included in **Appendix O** and **Appendix P** respectively. The plans have been updated to satisfy the current requirements of OAC 252:515-25. The updated cost estimates for closure and post-closure care have also been prepared and are included with the closure and post-closure plans.

## FIGURES



## LEGEND

PARKS & INSTITUTIONS		HIGHWAY CLASSIFICATIONS	
	National Scenic Byway		Interstate / FREE
	State Byway / Scenic Route		Turnpike / (with toll gate)
	State Park / State Resort Park		Two Lane Turnpike
	Wildlife Management Area		Multilane / Controlled Access
	National Recreation Area / National Forest or Grassland		Other Multilane Highways
	National Wildlife Refuge		Two Lane Paved (with passing lane)
	Restricted Wilderness Area		Paved Highways
	Restricted Military Area		Adjoining State Highways
	University or College		Roads Not On State Highway System
	Points of Interest	<b>ROUTE MARKERS</b>	
	Okla. Tourism Information Center		Interstate Route
	Local Tourism Information Center		U.S. Numbered Route
	General Aviation Airport		State Numbered Route
	Scheduled Airline Airport		State Numbered Route
	Private Airport	<b>OTHER MAP SYMBOLS</b>	
	Military Airport		Full Traffic Interchange
<b>CITIES &amp; TOWNS</b>			Partial Traffic Interchange
	State Capital		Access Denied (grade separation only)
	County Seat		Road under construction
	100,000 and over		County Line
	50,000 to 100,000		Railroad
	10,000 to 50,000		Amtrak Stations
	3,000 to 10,000		Safety Turnout
	1 to 3,000		Major Rest Area
	Unincorporated Places		Toll Road Concession
	Corporate Limits (5,000 and over)		Historical Route 66
			Chisholm Trail
			Handicapped Facilities

**NOTES:**

1. BASE MAP SOURCE: OKLAHOMA DEPARTMENT OF TRANSPORTATION, 2017-2018 OFFICIAL STATE MAP, TULSA INSERT.

*Turgay Mehmet Ertugrul*  
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 REGISTERED PROFESSIONAL ENGINEER  
 16948  
 12/20/2018  
 OKLAHOMA

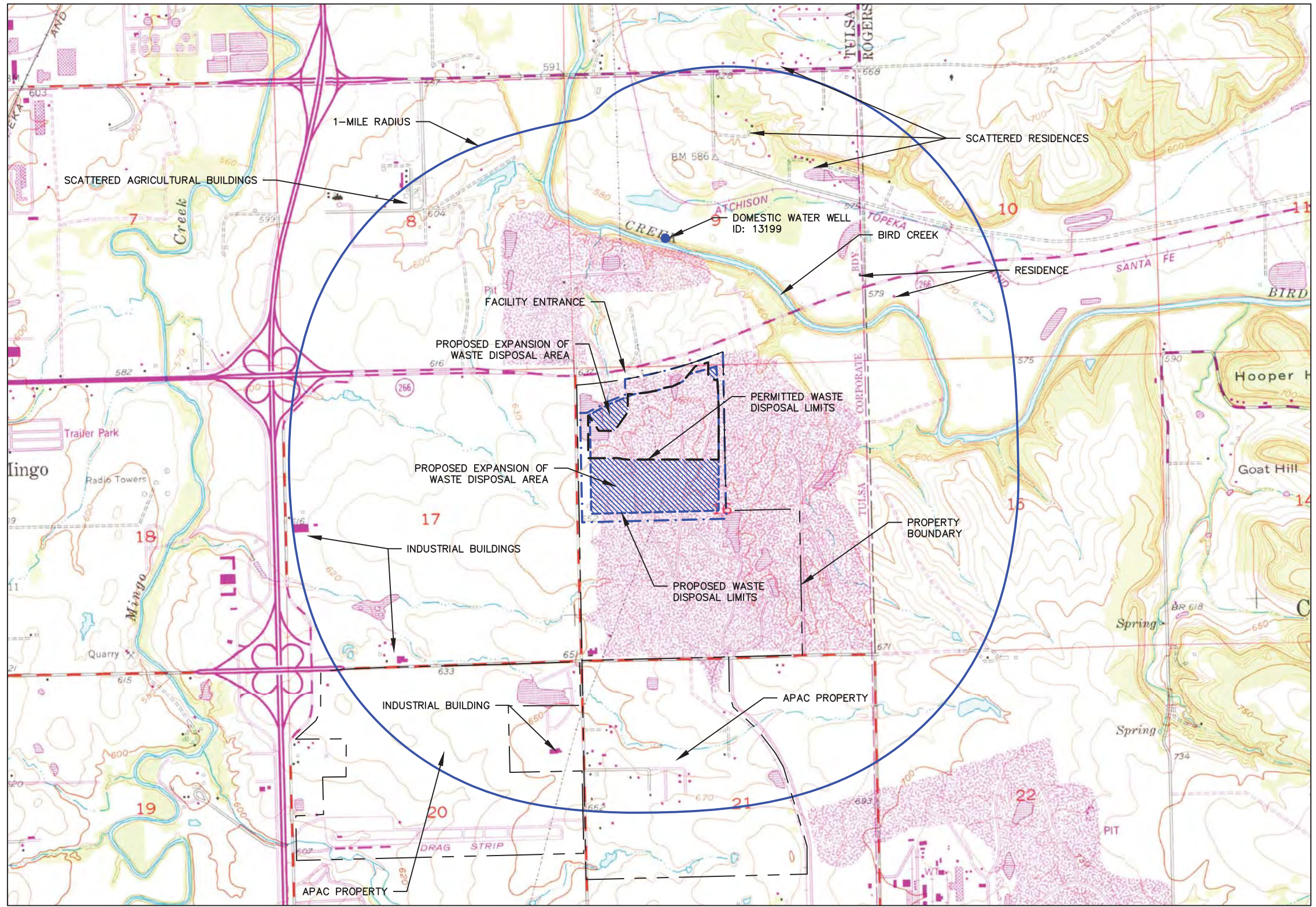
REVISIONS				
NO.	DATE	DESCRIPTION	REV BY	CHK BY

**GENERAL SITE LOCATION MAP**  
**TIER III LATERAL EXPANSION**  
**PERMIT MODIFICATION APPLICATION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**



DESIGNED BY:	DME
DRAWN BY:	DME
CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/20/2018
PROJECT NO.:	105-003
SCALE:	AS SHOWN

**FIGURE 1**



**LEGEND**

- PROPERTY BOUNDARY
- - - PERMITTED WASTE DISPOSAL LIMITS
- . - . PROPOSED PERMIT BOUNDARY
- - - PROPOSED WASTE DISPOSAL LIMITS
- WELL ID: 13199 DOMESTIC GROUNDWATER WELL

**NOTES:**

- 1) BASE MAP SOURCE: USGS 7.5 MINUTE QUADRANGLE TOPOGRAPHIC MAP, MINGO QUADRANGLE, PHOTOREVISED 1982.
- 2) WATER WELL AND SURFACE WATER INTAKE RECORDS WERE OBTAINED FROM THE OKLAHOMA WATER RESOURCES BOARD (OWRB) AND OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ) ON-LINE GIS DATABASES (MARCH 2018).
- 3) NO PUBLIC SURFACE WATER INTAKES WERE IDENTIFIED WITHIN A ONE-MILE RADIUS OF THE FACILITY.
- 4) ONE (1) PRIVATE WATER WELL (ID-13199) WAS IDENTIFIED WITHIN A ONE-MILE RADIUS OF THE FACILITY.
- 5) NO PUBLIC WATER AND WASTEWATER COLLECTION, TREATMENT, OR DISTRIBUTION FACILITIES WERE IDENTIFIED WITHIN A ONE-MILE RADIUS OF THE FACILITY.

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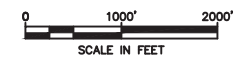
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**TOPOGRAPHIC SITE LOCATION MAP**  
**TIER III LATERAL EXPANSION**  
**PERMIT MODIFICATION APPLICATION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**



DESIGNED BY:	DME
DRAWN BY:	DME
CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/20/2018
PROJECT NO:	105-003
SCALE:	AS SHOWN

**FIGURE 2**



**LEGEND**

- PROPERTY BOUNDARY
- - - PERMITTED WASTE DISPOSAL LIMITS
- . - . - . PROPOSED PERMIT BOUNDARY
- PROPOSED WASTE DISPOSAL LIMITS

NOTES:  
 1) BASE MAP SOURCE: GOOGLE EARTH, AERIAL PHOTOGRAPH DATED MARCH, 12, 2018.

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**SURROUNDING LAND USE MAP**  
**TIER III LATERAL EXPANSION**  
**PERMIT MODIFICATION APPLICATION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**



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PROJECT NO:	105-003
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**FIGURE 3**



**LEGEND**

- PROPERTY BOUNDARY
- - - PERMITTED WASTE DISPOSAL LIMITS
- . - . - . PROPOSED PERMIT BOUNDARY
- - - - - PROPOSED WASTE DISPOSAL LIMITS

NOTES:  
 1) BASE MAP SOURCE: FEMA NATIONAL FLOOD HAZARD FIRM PANELS: 40143C0252L (EFFECTIVE 10/16/2012), 40143C0253L (EFFECTIVE 10/16/2012), 40143C0254L (EFFECTIVE 10/15/12), 40131C0335H (EFFECTIVE 4/3/12), AND 40131C0335H (EFFECTIVE 4/3/12).

**Legend**

- Advisory Base Flood Elevation Layers**
- Advisory Zone V-A Boundary (zoom in to make visible)
  - Limit of Moderate Wave Action (LIMWA) (zoom in to make visible)
  - Advisory Shaded Zone X (zoom in to make visible)
  - Advisory Base Flood Elevation Zones (zoom in to make visible)
  - Advisory Zones V and A (zoom in to make visible)

- National Flood Hazard Layer (Official)**
- Flood Hazard Boundaries**
- Limit Lines
  - SFHA / Flood Zone Boundary
  - Other Boundaries
- Flood Hazard Zones**
- 1% Annual Chance Flood Hazard
  - Regulatory Floodway
  - Special Floodway
  - Area of Undetermined Flood Hazard
  - 0.2% Annual Chance Flood Hazard
  - Future Conditions 1% Annual Chance Flood Hazard
  - Area with Reduced Wave Periods

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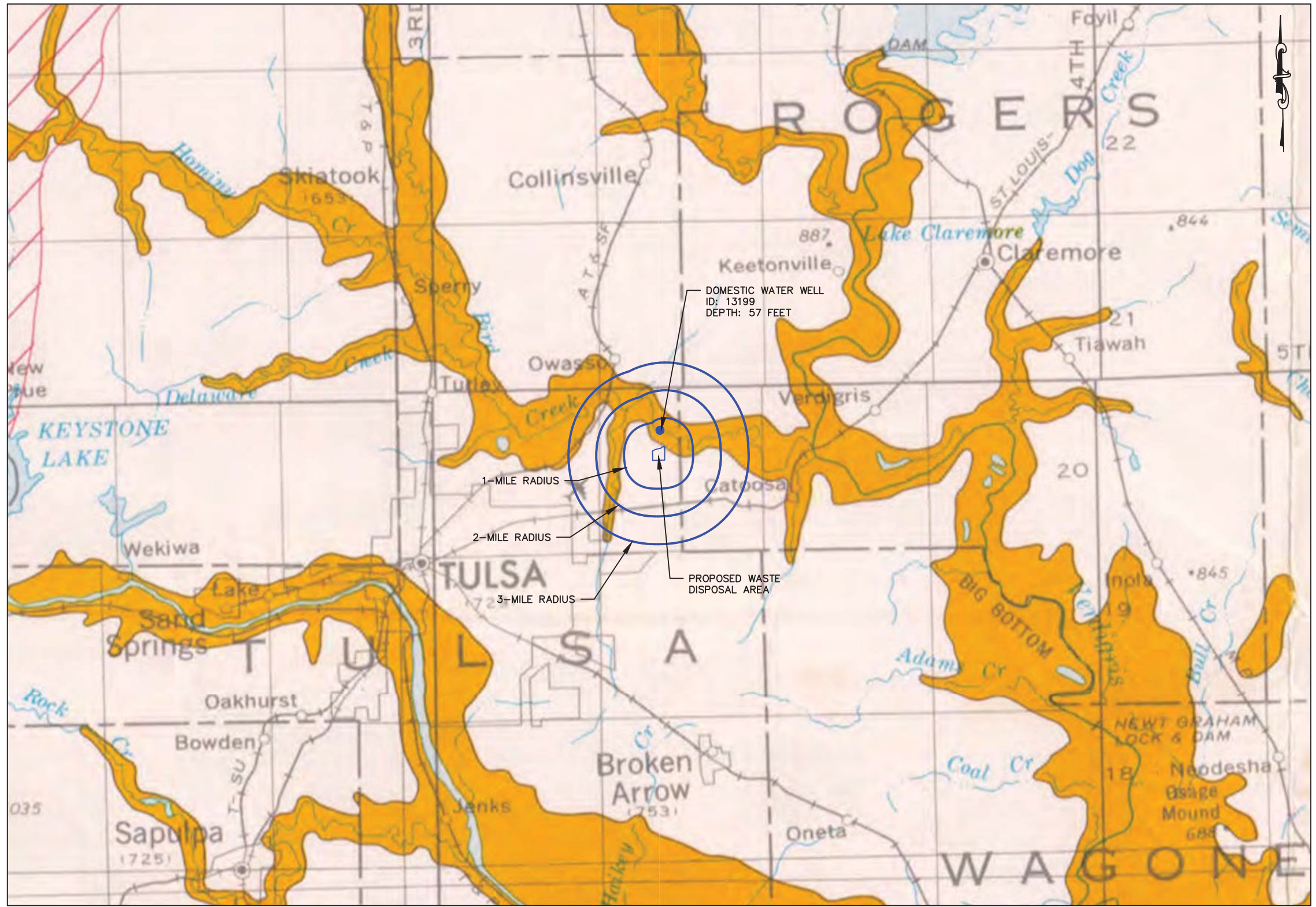
**FEMA FLOODPLAIN MAP  
 TIER III LATERAL EXPANSION  
 PERMIT APPLICATION  
 APAC EAST QUARRY C&D LANDFILL  
 TULSA COUNTY, OKLAHOMA**




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**FIGURE 4**





**EXPLANATION**

 **Alluvium and Terrace Deposits and Their Recharge Areas** (Quaternary in age). Unconsolidated deposits of sand, silt, clay, and gravel that occur along or adjacent to modern and ancient streams. Thickness generally ranges from 10 to 50 ft (locally as much as 100 ft). Wells generally yield 10 to 500 gpm of water (locally several thousand gpm), and most water is of good quality (less than 1,000 mg/L dissolved solids). Recharge areas are essentially the same as distribution of the alluvium and terrace deposits.

 **Bedrock Aquifers and Their Recharge Areas** (Cambrian through Tertiary in age). Rock units and sediments that generally are favorable or moderately favorable for development of groundwater resources. Thickness of aquifers generally ranges from 100 ft to several thousand ft. Depths to fresh water range from a few feet to more than 1,000 ft, with most wells 100-400 ft deep. Wells drilled into these aquifers generally yield 25-300 gpm, although wells in some aquifers yield up to 600-2,500 gpm. Water in most aquifers is of good to fair quality (300-1,500 mg/L dissolved solids). Pattern on map also includes known and potential recharge areas for bedrock aquifers.



- NOTES:**
- 1) BASE MAP SOURCE: "MAP OF AQUIFERS AND RECHARGE AREAS IN OKLAHOMA" COMPILED BY KENNETH S. JOHNSON, OKLAHOMA GEOLOGICAL SURVEY (1991).
  - 2) WATER WELL RECORDS WERE OBTAINED FROM THE OKLAHOMA WATER RESOURCES BOARD (OWRB) ON-LINE GIS DATABASES (MARCH 2018).
  - 3) ONE (1) PRIVATE WATER WELL (ID:13199) WAS IDENTIFIED WITHIN A ONE-MILE RADIUS OF THE FACILITY.
  - 4) NO PUBLIC WATER SUPPLY WELLS WERE IDENTIFIED WITHIN A TWO-MILE RADIUS OF THE FACILITY.
  - 5) RECHARGE AND DISCHARGE AREAS ARE FURTHER DISCUSSED IN THE JUNE 2018 SUBSURFACE INVESTIGATION AND GROUNDWATER STUDY REPORT.

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**GROUNDWATER RESOURCE AND USAGE MAP**

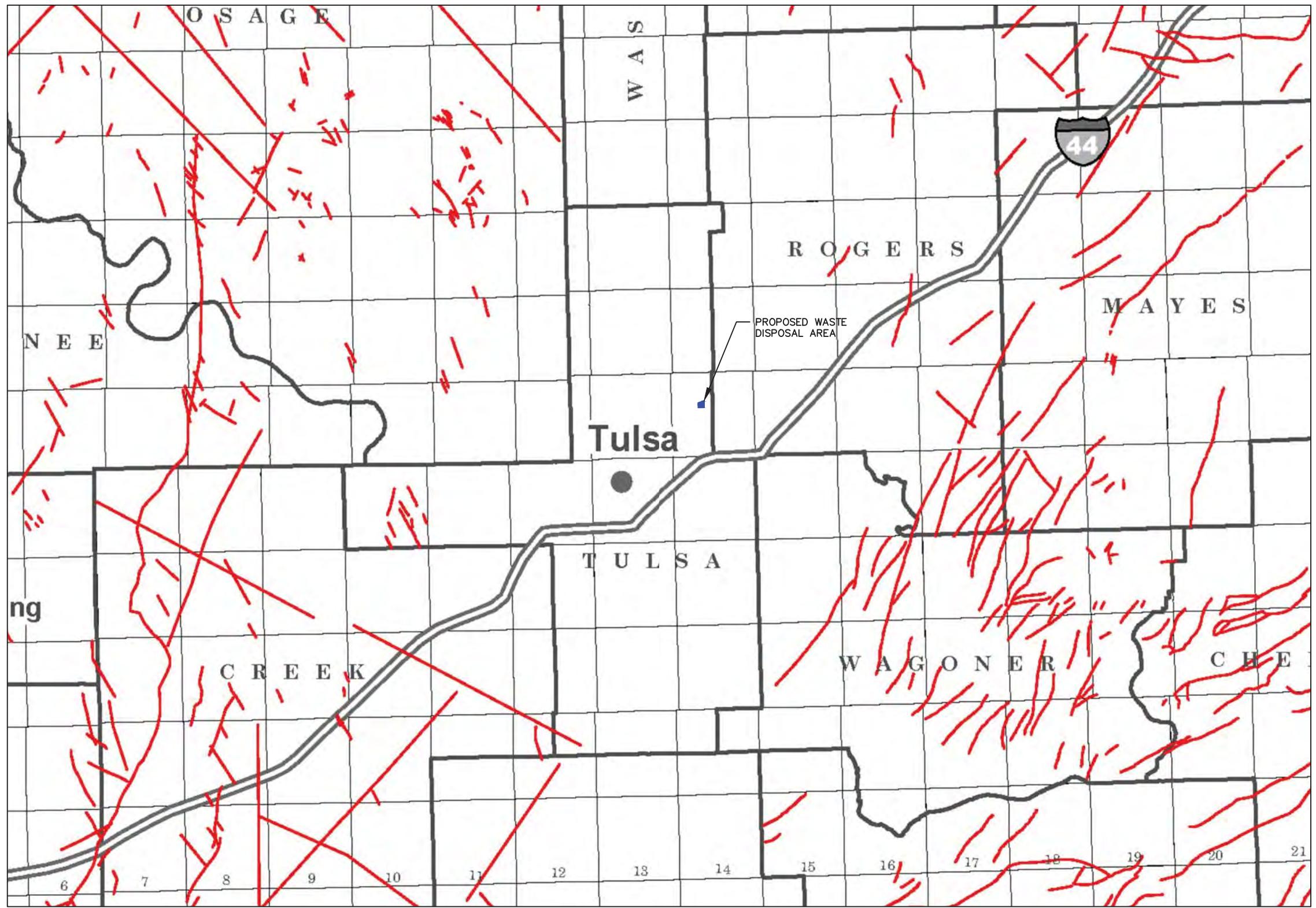
**TIER III LATERAL EXPANSION PERMIT MODIFICATION APPLICATION**

**APAC EAST QUARRY C&D LANDFILL TULSA COUNTY, OKLAHOMA**



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CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/20/2018
PROJECT NO:	105-003
SCALE:	AS SHOWN

**FIGURE 5**



NOTES:  
 1) BASE MAP SOURCE: OKLAHOMA GEOLOGICAL SURVEY, OPEN FILE REPORT OF2-2016, "INTERPRETIVE FAULT MAP OF OKLAHOMA" STEPHEN MARSH, MAY 2016.

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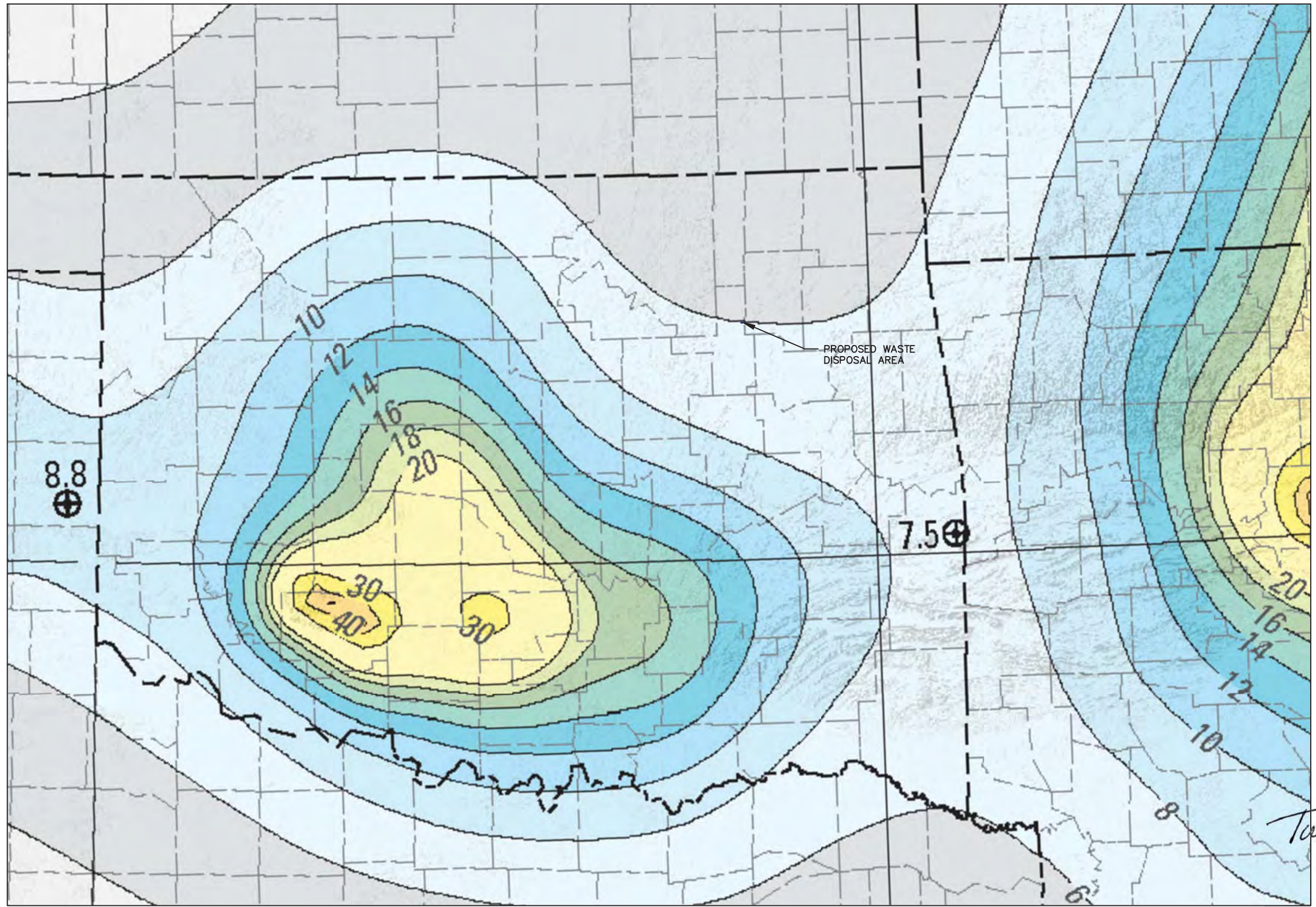
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**AREA FAULT MAP**  
**TIER III LATERAL EXPANSION**  
**PERMIT MODIFICATION APPLICATION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**

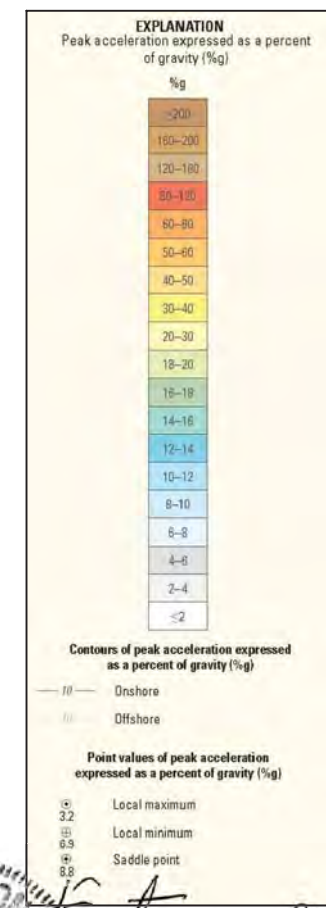


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PROJECT NO:	105-003
SCALE:	AS SHOWN

FIGURE 6



NOTES:  
 1) BASE MAP SOURCE: UNITED STATES GEOLOGICAL SURVEY, SEISMIC-HAZARD MAPS FOR CONTERMINOUS UNITED STATES, PEAK HORIZONTAL ACCELERATION WITH 2 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS, 2015.



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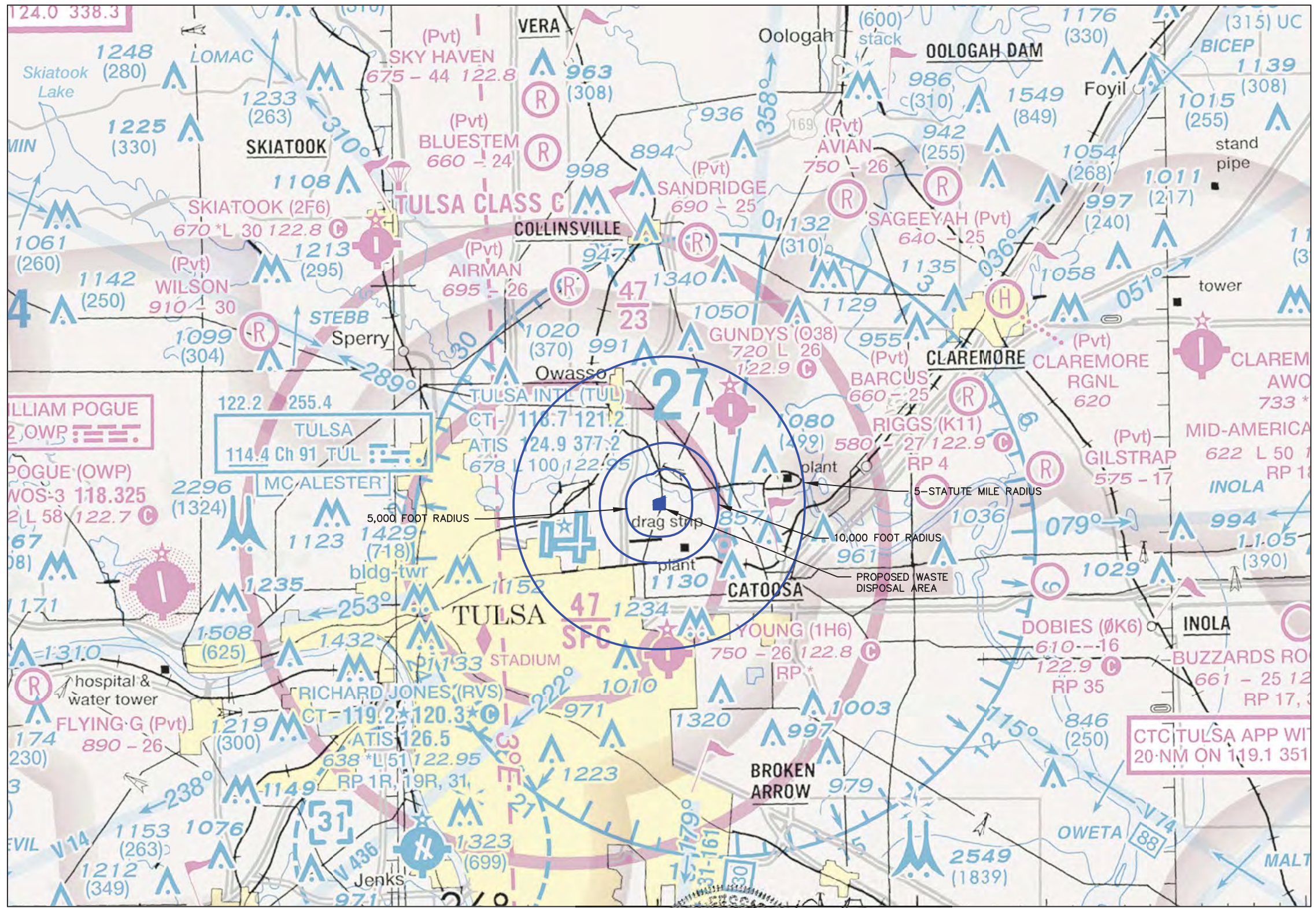
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**SEISMIC HAZARD MAP**  
**TIER III LATERAL EXPANSION**  
**PERMIT MODIFICATION APPLICATION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**



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APPROVED BY:	TME
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PROJECT NO:	105-003
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FIGURE 7



NOTES:  
1) BASE MAP SOURCE: FEDERAL AVIATION ADMINISTRATION, SECTIONAL AERONAUTICAL CHART, KANSAS CITY SECTIONAL, MAY 24, 2018.

SCALE IN STATUTE MILES

### LEGEND

Airports having Control Towers are shown in Blue, all others in Magenta. Consult Chart Supplement for details involving airport lighting, navigation aids, and services. All times are local. For additional symbol information refer to the Chart User's Guide.

#### AIRPORTS

- Other than hard-surfaced runways
- Hard-surfaced runways 1500 ft. to 3000 ft. in length
- Hard-surfaced runways greater than 3000 ft. or some multiple runways less than 3000 ft.
- Open but within hard-surfaced runway configuration indicates approximate VOR, VOR-DME, DME or VORTAC location.
- All recognizable hard-surfaced runways, including those closed, are shown for visual identification. Airports may be public or private.

#### AIRPORT DATA

- Box indicates FAR 91, FSS, FAR 119, Special Air Traffic Rules & Airport Traffic Patterns
- Runways with Right Traffic
- RP + Special conditions exist
- FSS - Flight Service Station
- CT - 118.3 - Control Tower (CT) - primary frequency
- NO SVFR - Fixed-wing special VFR flight is prohibited
- Star indicates operation part-time. See tower frequencies for hours of operation.
- Follows the Common Traffic Advisory Frequency (CTAF)
- ATIS 123.8 - Automatic Terminal Information Service
- AFIS 135.2 - Automatic Flight Information Service (AFIS)
- ASOS/AWOS 135.42 - Automated Surface Weather Observing System (shown where full-time ATIS not available). Some ASOS/AWOS facilities may not be located at airports.
- UNICOM - Aeronautical advisory station
- VFR ADVISORY - VFR Advisory Service shown where full-time ATIS not available and frequency is other than primary CT frequency.
- 2555 - Elevation in feet
- L - Lighting in operation Sunset to Sunrise
- L - Lighting installation user; refer to Supplement.
- 72 - Length of longest runway in hundreds of feet; usable length may be less.
- When information is lacking, the respective character is replaced by a dash. Lighting codes refer to runway edge lights and may not represent the longest runway or full-length lighting.
- Rotating airport beacon in operation Sunset to Sunrise
- OBJECTIONABLE - Airport may adversely affect airspace use.

#### ADDITIONAL AIRPORT INFORMATION

- Private "Pvt" - Non-public use having emergency or landmark value
- Military - Other than hard-surfaced; all military airports are identified by abbreviations AFB, NAS, AAF, etc.
- Unimproved
- Abandoned - paved having landmark value, 2000 ft. or greater
- Unlighted
- Flight Park Selected

#### AIRPORT TRAFFIC SERVICE AND AIRSPACE INFORMATION

Only the controlled and reserved airspace effective below 18,000 ft. MSL are shown.

- Class B Airspace
- Class C Airspace (Magenta Circle)
- Class D Airspace
- Class E Airspace
- Class E Airspace with floor 700 ft. above surface that laterally abuts Class G Airspace
- Class E Airspace with floor 700 ft. above surface that laterally abuts 1200 ft. or higher Class E Airspace
- Class E Airspace with floor 1200 ft. or greater above surface that laterally abuts Class G Airspace
- Class E Airspace with floor 2400 MSL
- Class E Airspace greater than 700 ft. above surface.
- Class E Airspace exists at 1200' AGL, unless otherwise designated as shown above.
- Class E Airspace low altitude (FLANAV 2) Flights are indicated by center line.
- Intersection - Airspace are directed towards facilities which establish intersection.
- Helicopter (See FAR 91.215(A))
- Prohibited, Restricted, and Warning Areas, Caravan Advisory, Danger, and Restricted Areas
- Alert Area and MDA - Military Operations Area
- Special Airport Traffic Area (See FAR 91.215(A))
- MDA - Air Defense Identification Zone (See FAR 91.215(A))
- National Security Area
- Terminal Radar Service Area (TRSA)
- ATIS - Military Training Route

#### COMMUNICATION BOXES

- 122.1R 122.6 123.6
- 352 358 OAK
- 122.1R CHICAGO CHI
- Heavy line box indicates Flight Service Station (FSS). Frequencies 123.5, 123.6, 243.0 and 243.1 are available at many FSSs and are not shown above boxes. All other frequencies are shown.
- Operates less than continuous or On-Request.
- ASOS/AWOS
- HWRAS
- TWEB
- FSS radio providing voice communication
- MIAMI
- Frequencies above this line box are removed to NAVDAD sites. Other FSS frequencies providing voice communication may be available as determined by altitude and terrain. Consult Supplement for complete information.

#### RADIO AIDS TO NAVIGATION

- VHF OME RANGE (VOR)
- VOR-DME
- DME
- VORTAC
- Other facilities, i.e., FSS Outlet, RCO, W/CAM (A/C) (see Supplement), etc.
- Non-Directional Radio Beacon (NDB)
- MOB - DME

#### OBSTRUCTIONS

- 1000 ft and higher AGL
- Above 200 ft. & below 1000 ft. AGL in urban areas
- Wind Turbine
- Wind Turbine Farm
- Elevation of the top above mean sea level (1149)
- Height above ground
- Under construction or elevation unverified
- Obstruction with high-intensity lighting may operate part-time

#### MISCELLANEOUS

- A - Aerobatic Practice Area (See Supplement)
- G - Clear Obstruction
- H - Hang Glider Activity
- U - Unmanned Aircraft Activity
- Parachute Jumping Area (See Supplement)
- STADIUM
- Stadium Intersecting TFR also (within 3 NM, up to & first 2000' AGL)
- Space Launch Activity Area (See Supplement)
- Mare's Light
- VPXYZ
- VFR Waypoints (See chart tabulation for latitude/longitude)
- NAME (VPAT2)

#### TOPOGRAPHIC INFORMATION

- Mountain Pass
- 1182 - Elevation of Pass
- Pass symbol does not indicate a recommended route or direction of flight and pass elevation does not indicate a recommended clearance altitude. Hazardous flight conditions may exist within and near mountain passes.
- Aerial Cable
- Landing Tower
- 618 - Elevation Base of Tower

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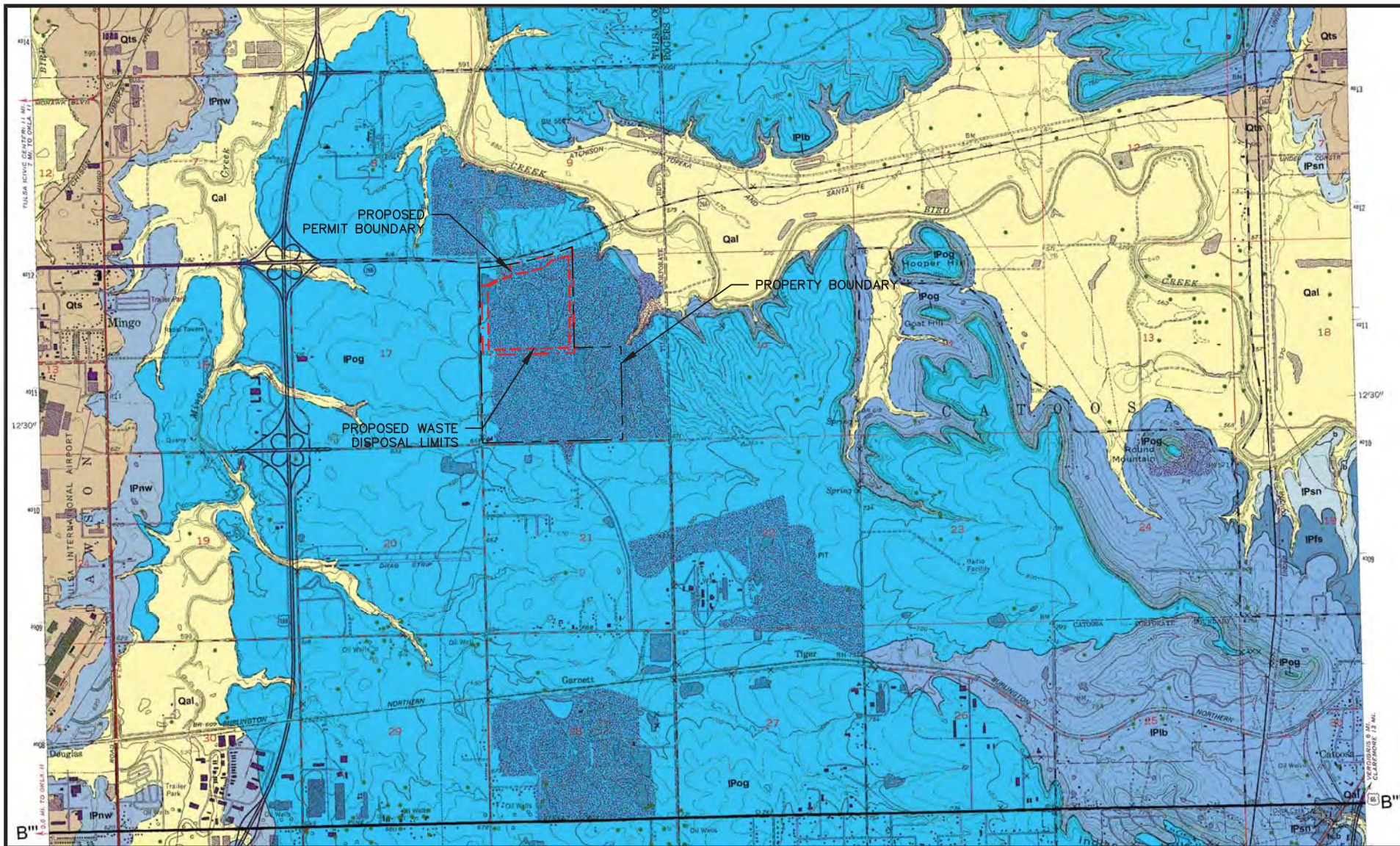
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**SECTIONAL AERONAUTICAL CHART**  
**TIER III LATERAL EXPANSION**  
**PERMIT MODIFICATION APPLICATION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**

**E&E ENGINEERING**  
and Associates

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APPROVED BY:	TME
ISSUE DATE:	06/20/2018
PROJECT NO.:	105-003
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**FIGURE 8**



**DESCRIPTION OF UNITS\***

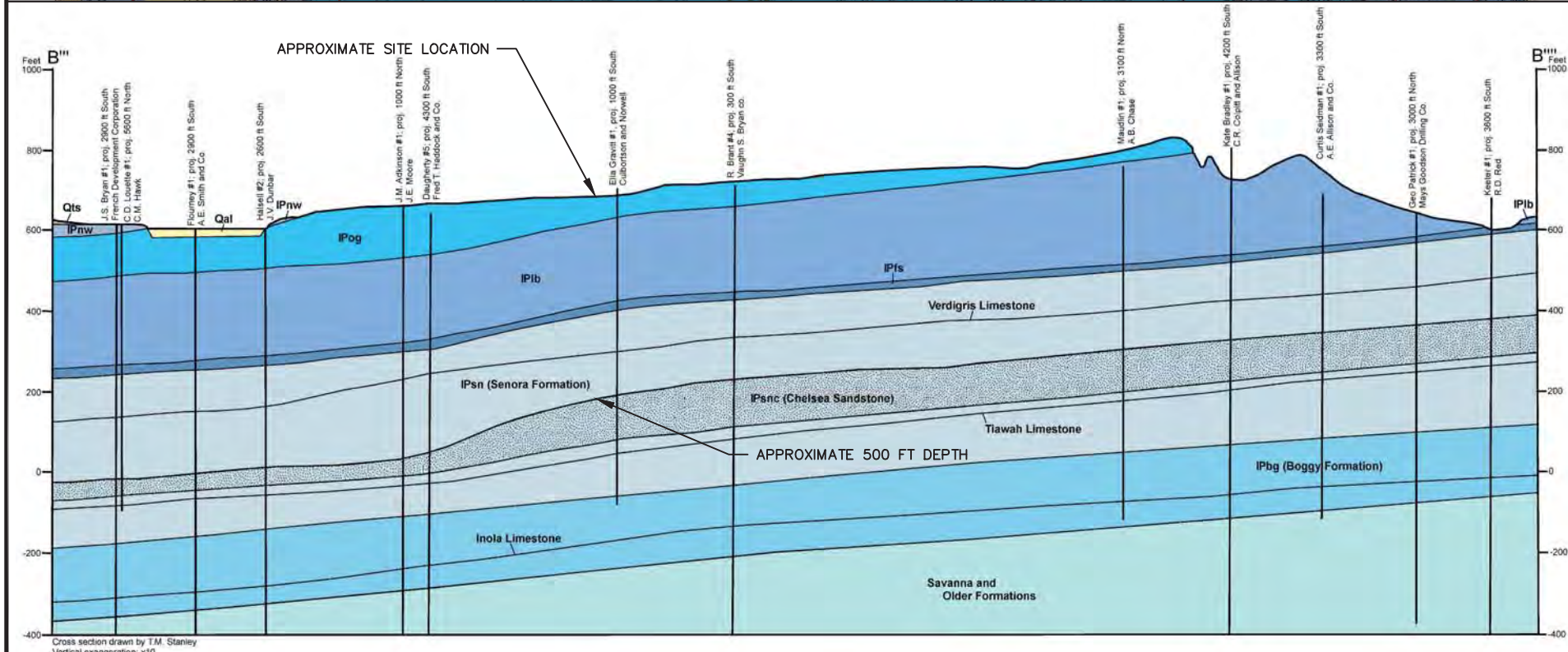
- Qal** ALLUVIUM (Holocene) - Clay, silt, sand, and gravel in channels and on flood plains of modern streams. Includes terrace deposits of similar composition located directly above and adjacent to modern channels and flood plains. Thickness: 0 to about 30 ft.
- Qts** UPPER TERRACE SANDS (Holocene and Pleistocene(?) ) - Consists mostly of unconsolidated fine- to medium-grained quartz sand, silt, and clay, little to no gravel-sized material observed. Situated just above modern flood plains and drainages. Thickness: 0 ft to as much as 20 ft; averages closer to 8 ft thick.
- IPrw** NOWATA FORMATION (Pennsylvanian, Desmoinesian) - Rarely crops out in map area. Areas inferred to be Nowata consist of a light brown (5YR5/6) to light gray (N7) silty, clay loam soil, which probably formed from a silty clay shale. Basal contact drawn along the inferred, western-most extent of outcrops of Oologah Formation. Only the basal 25 to 30 ft exposed in quad based on cross section.
- IPog** OOLOGAH FORMATION (Pennsylvanian, Desmoinesian) - Formation predominantly a medium gray (N5), medium dark gray (N4), medium bluish gray (5B5/1), to locally yellowish gray (5Y7/2) limestone, with local intervals of sandstone or fossiliferous shale. Lower third to half of formation limestone characterized by alternating thin- to medium bedded, wavy, skeletal and whole-fossil mudstones and wackestones, generally, thinner bedded limestones of the lower part of the Oologah tend to have a wackestone texture and yellowish-gray hue, while thicker bedded limestones have a fine mudstone texture and bluish-gray hue; bedding varies between 1-15' thick. Thin fractures filled with sparry calcite common throughout lower interval. Fossils dominated by numerous species of brachiopod, phylloid algal, and crinoid debris; fenestrate and ramose bryozoans present in thicker beds, while bivalve-filled burrows also common in some sections with a large complement of argillaceous limestone. Limestones in the upper half of exposed Oologah tend to be more regular, thin bedded, slightly argillaceous, fossiliferous mudstones, bedding planar to slightly wavy, ranging from 2-5' thick, fossils similar to lower part, except less of a phylloid algal content. About 30-40 ft above base of formation, throughout most of the southern half of quad, encounter a 3-5 ft lenticular interval of pale yellowish orange (10YR6/6), weakly indurated, thin, planar beds of fine-grained, non-calcareous, argillaceous sandstone, with local shale interbeds and partings. Sandstone and shale interval appears to pinch-out after a few 10's of feet in dip direction. Oologah Limestone immediately above sandstone interval contain irregularly-shaped chert pods, most of which have been weathered out along with fossil components, suggesting paleo-karst erosion may have occurred. Near top of formation, locally find 2 to 3 ft thick, lenticular intervals of fossiliferous clay shale. Shales light brown (5YR5/4) to grayish orange pink (5YR7/2) in color, slightly silty, calcareous, and laminated. Intervals appear to pinch-out after a few feet along strike and dip. Fossil components dominated by monotypic assemblages of *Naechonetes*, with minor *Juresania* and fenestrate bryozoans. Total thickness of the Oologah Formation about 110 ft.
- IPib** LABETTE FORMATION (Pennsylvanian, Desmoinesian) - Light olive gray (5Y5/2) to dusky yellow (5Y6/4), occasionally medium light gray (N6), laminated, very silty to sandy, micaceous, concretionary clay shale, concretions dusky red (5R4/2) to moderate red (5R5/4), composed of hematite and/or siderite(?), and usually occur sporadically throughout formation as 1-3" diameter discoid-shaped clasts. Clay shale predominantly non-calcareous, although some narrow horizons are weakly calcareous (particularly those associated with abundant concretions). Locally, various non-descript very sandy or sandstone horizons occur, mostly these sand horizons are planar laminated to thin-bedded, but one at 15 ft above base of the Labette is trough-cross-bedded. Within the upper 50 ft. of the formation a sequence of interbedded sandstones and shales (Peru sandstones) occurs. The Peru sandstones consist of between 2 to 4 intervals of dusky yellow (5Y6/4), moderately indurated, thin- to medium, trough-cross-bedded, fine-grained, non-calcareous sandstones, sandstone intervals vary between 5 to as much as 15 ft thick, where the thicker intervals have been variously termed the Upper and Lower Peru Sandstones by previous investigators. Each sandstone interval is separated by 7 to 10 ft thick interval of well-laminated, finer-bedded, calcareous, interbedded mud shale and siltstone. Locally, and where the Peru sandstones are absent, a highly fossiliferous clay shale may occur within the uppermost 30 ft of the formation. These fossiliferous clay shales are typically pale yellowish brown (10YR5/2), yellowish gray (5Y7/2), to rarely mottled yellow (5Y7/6), slightly silty, calcareous and well-laminated. Fossils are dominated by *Desmoinesia*, *Linoproductus*, *Juresania* and *Naechonetes*, and with minor faunal elements consisting of small ramose bryozoans, crinoid debris and small spirifer brachiopods. The Sageyish limestone was not observed in this quadrangle. In the map area the Labette Formation varies between 220 to 260 ft thick.
- IPfs** FORT SCOTT FORMATION (Pennsylvanian, Desmoinesian) - In the Mingo Quadrangle the formation consists of only two members, in descending order: 1) the Little Osage Shale, and 2) the Blackjack Creek Limestone. Thickness of the formation is about 7 to 12 ft, averaging closer to 10 ft thick. Little Osage Shale: Similar to the Excello Shale of the Senora Formation, a medium dark gray (N4) to dark gray (N3), well-laminated to fissile, phosphatic clay shale, upper 5-8' a light brownish gray (5YR6/1), blocky bedded, silty, calcareous, fossiliferous clay shale. Phosphate nodules throughout lower part of member, occurring as 0.25-0.5', ovoid-shaped clasts. Thickness usually 5 ft, but may be as thin as 2 ft locally. Blackjack Creek Limestone: Light gray (N7), medium light gray (N6), light brownish gray (5YR6/1), to moderate orange pink (5YR6/4), thin, planar to wavy bedded, skeletal to whole-fossil wackestone. Bedding varies from 2' to 5' thick, wavy bedding contacts due (in part) to stromatolitic bedding, limestone in upper 1-3 ft of member exhibiting wavy laminated bedding and more fragmentary bioclasts compared to lower parts of member. Fossils dominated by spirifer and productid brachiopods, and crinoid debris; algae and fusulinids common in some intervals. Thickness from 5 to 10 ft, averaging close to 7 ft.
- IPsn** SENORA FORMATION (Pennsylvanian, Desmoinesian) - Mainly a silty to sandy clay shale, locally interlaminated with 0.15-1' thick very fine-grained sandstone and siltstone beds, clay shale bedding laminated, becoming blocky where deeply weathered; color variable, ranging from the most frequent to infrequent: medium light gray (N6), brownish gray (5YR4/1), grayish orange (10YR7/4), very pale orange (10YR8/2), dark yellowish orange (10YR6/2), pale brown (5YR5/2), light brown (5YR5/6), grayish yellow (5Y8/4), and yellowish gray (5Y7/2); clay is predominant cement, calcite rare. Clay shales immediately above coal seams tends to be harder, silt-free, slightly phosphatic, with slightly thicker laminated bedding, and are weakly calcareous; color usually a medium dark gray (N4). The interlaminated sandstones and siltstones are friable to poorly indurated, usually a very pale orange (10YR8/2), pale orange (10YR8/2), or dark yellowish orange (10YR6/2) sandstone more common than siltstone, typically fine- to very fine-grained, predominant cement is clay, with a possible weak silica. Total thickness of the Senora Formation exposed in quad is about 13 ft. A number of prominent stratigraphic horizons occur in the Senora Formation, these are in descending order: Excello Shale: A medium dark gray (N4) to dark gray (N3), well-laminated to fissile, phosphatic clay shale; however, upper 2-5' a light brownish gray (5YR6/1) to pale brown (5YR5/2), laminated, slightly silty, calcareous, fossiliferous clay shale. Phosphate nodules throughout lower part of member, occurring as 0.25-0.5', ovoid-shaped clasts. Thickness from 3-6 ft, averaging 4 ft. Breezy Hill Limestones (b, fb, b): Grayish orange (10YR7/4), yellowish gray (5Y7/2), pale olive (10YR6/2), to medium light gray (N6), locally dark gray (N5), predominantly an alternating thin- to medium, wavy bedded, whole-fossil and skeletal wackestone. Bedding varies from 3-16' thick, with thinner bedding characterized by skeletal textures, and medium bedding a characteristically whole-fossil texture. Large *Linoproductus*, other small *productus* (*Desmoinesia*) and *mesolobids* are the most common fossils; chonetid sponges and large crinoid stems also present. Skeletal material usually consists of sub-angular crinoid debris (ossicles and plates), and nondescript brachiopod shell fragments. Some exposures of the Breezy Hill contain an unusual facies consisting of a dense, dark gray colored, fossiliferous carbonate mudstone; fossils consist exclusively of well preserved, monotypic assemblages of *Mesolobus*; facies commonly occurs near the contact with the Excello Shale. In areas on map where the Breezy Hill Limestone and Fort Scott Formation occur in close proximity, the basal contact of the Breezy Hill is labeled with an 'fb'. Overall, the Breezy Hill is thicker and more wavy bedded than the overlying Blackjack Creek Limestone. Thickness of the unit about 7 to 8 ft. Kinnison Shale: Moderate yellowish brown (10YR5/4) to medium light gray (N6), fissile to well-laminated, fossiliferous silty clay shale. Base occurs at the top of the Iron Post coal. Due to extreme thickness of the underlying Lagonda Sandstone this shale interval rarely exceeds 1 ft, and averages closer to 6 inches in thickness. Iron Post coal: Where observed, coal is a single bed, black (N1) to grayish black (N2), having well-developed 2 directional cleats. Associated underlay not well-developed. Thickness about 6 to 8 inches.



**LEGEND**

- PROPERTY BOUNDARY
- - - PROPOSED PERMIT BOUNDARY
- - - PROPOSED WASTE DISPOSAL LIMITS

NOTES:  
1) BASE MAP SOURCE: OKLAHOMA GEOLOGIC QUADRANGLE OGG-70, GEOLOGIC MAP OF THE MINGO 7.5' QUADRANGLE, ROGER, TULSA, AND WAGONER COUNTIES, OKLAHOMA, 2006.



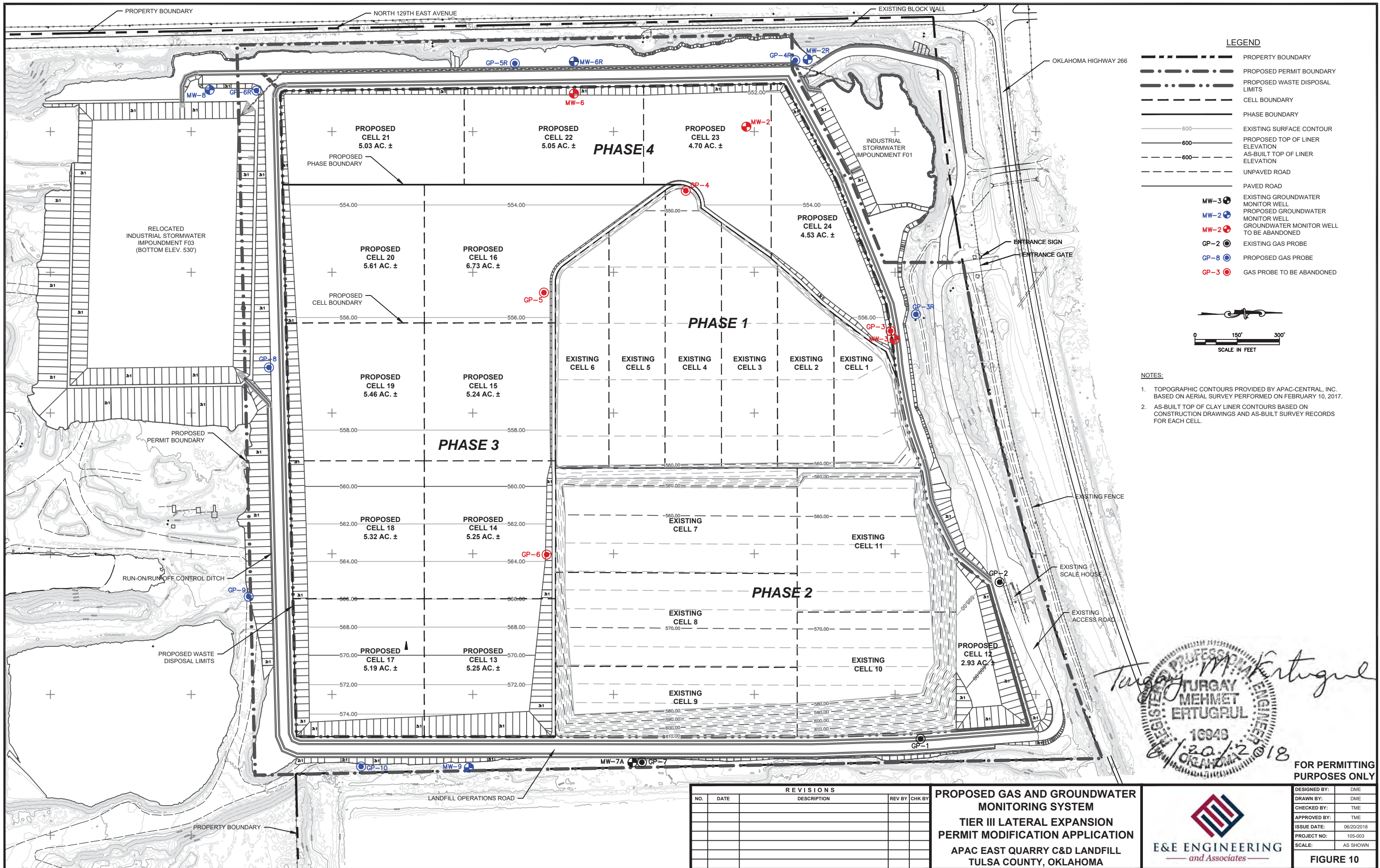
**SURFACE GEOLOGY MAP AND CROSS-SECTION**  
**TIER III LATERAL EXPANSION PERMIT MODIFICATION APPLICATION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**



DESIGNED BY:	DME
DRAWN BY:	DME
CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/20/2018
PROJECT NO:	105-003
SCALE:	AS SHOWN

**FIGURE 9**





**LEGEND**

- PROPERTY BOUNDARY
- . - . - . PROPOSED PERMIT BOUNDARY
- - - - - PROPOSED WASTE DISPOSAL LIMITS
- - - - - CELL BOUNDARY
- - - - - PHASE BOUNDARY
- 600 --- EXISTING SURFACE CONTOUR
- 600 --- PROPOSED TOP OF LINER ELEVATION
- 600 --- AS-BUILT TOP OF LINER ELEVATION
- - - - - UNPAVED ROAD
- PAVED ROAD
- MW-3 (circle with cross) EXISTING GROUNDWATER MONITOR WELL
- MW-2 (circle with cross) PROPOSED GROUNDWATER MONITOR WELL
- MW-1 (circle with cross) GROUNDWATER MONITOR WELL TO BE ABANDONED
- GP-2 (circle with cross) EXISTING GAS PROBE
- GP-8 (circle with cross) PROPOSED GAS PROBE
- GP-3 (circle with cross) GAS PROBE TO BE ABANDONED

0 150' 300'  
SCALE IN FEET

- NOTES:**
- TOPOGRAPHIC CONTOURS PROVIDED BY APAC-CENTRAL, INC. BASED ON AERIAL SURVEY PERFORMED ON FEBRUARY 10, 2017.
  - AS-BUILT TOP OF CLAY LINER CONTOURS BASED ON CONSTRUCTION DRAWINGS AND AS-BUILT SURVEY RECORDS FOR EACH CELL.

*Turgay M. Ertugrul*  
**TURGAY MEHMET ERTUGRUL**  
 16943  
 1/20/2018  
 OKLAHOMA

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REVISIONS				
NO.	DATE	DESCRIPTION	REV BY	CHK BY

**PROPOSED GAS AND GROUNDWATER MONITORING SYSTEM**  
**TIER III LATERAL EXPANSION**  
**PERMIT MODIFICATION APPLICATION**  
 APAC EAST QUARRY C&D LANDFILL  
 TULSA COUNTY, OKLAHOMA



DESIGNED BY:	DME
DRAWN BY:	DME
CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/20/2018
PROJECT NO:	105-003
SCALE:	AS SHOWN

FIGURE 10

## PERMIT DRAWINGS

# APAC-CENTRAL, INC

## EAST QUARRY C&D LANDFILL

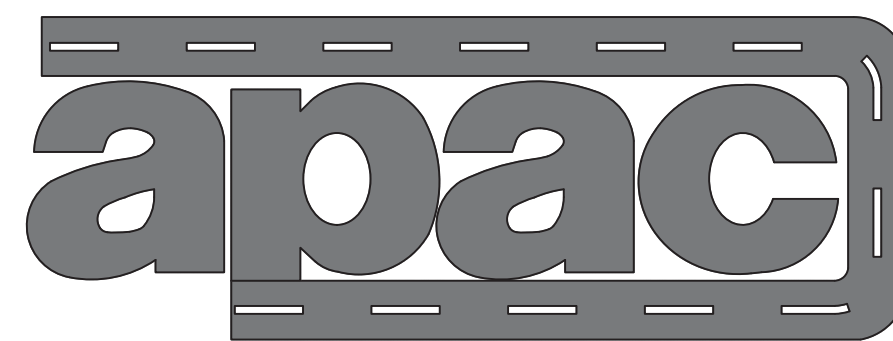
### TULSA, OKLAHOMA

## TIER III PERMIT MODIFICATION APPLICATION FOR PROPOSED LATERAL EXPANSION

INDEX TO DRAWINGS	
SHEET NO.	DRAWING TITLE
1	COVER AND VICINITY MAP
2	EXISTING CONTOUR MAP
3	EXISTING SITE PLAN
4	PROPOSED SUBGRADE PLAN
5	PROPOSED TOP OF LINER PLAN
6	PROPOSED FINAL COVER PLAN
7	COMPLETION AND STORMWATER PLAN
8	CROSS SECTION LOCATION MAP
9	CROSS SECTION A-A'
10	CROSS SECTION B-B'
11	CROSS SECTION C-C'
12	CROSS SECTION D-D'
13	CROSS SECTION E-E'
14	LINER SYSTEM DETAILS
15	COVER SYSTEM DETAILS
16	STORMWATER DETAILS
17	STORMWATER DETAILS

JUNE 2018

PREPARED FOR:



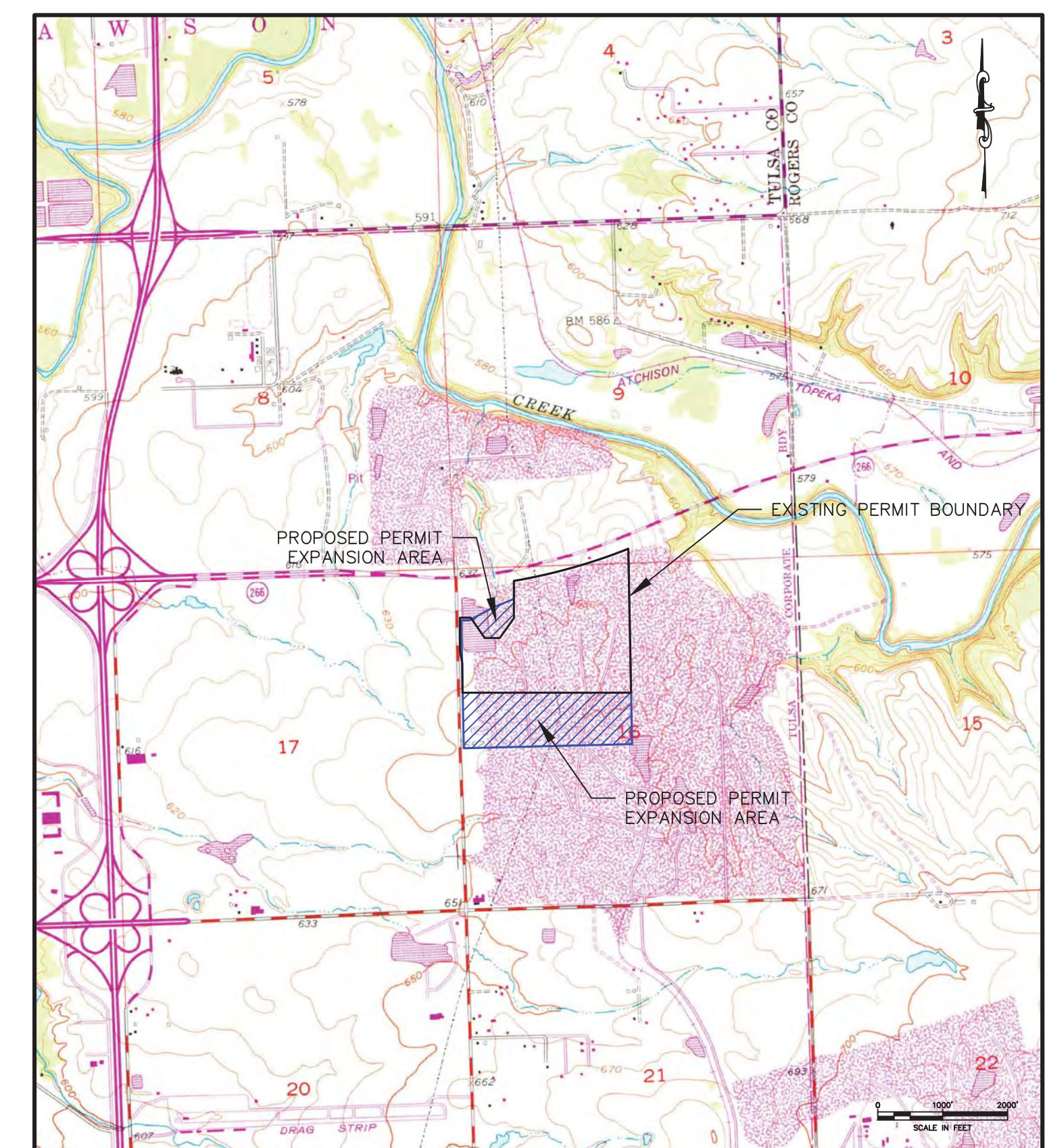
APAC-Central, Inc.

PREPARED BY:



**E&E ENGINEERING**  
— and Associates —

CERTIFICATE OF AUTHORITY NO. 7889  
2301 NORTH YELLOWWOOD AVENUE | BROKEN ARROW, OKLAHOMA 74012  
PHONE: 918-957-1300 | FAX: 918-957-1313

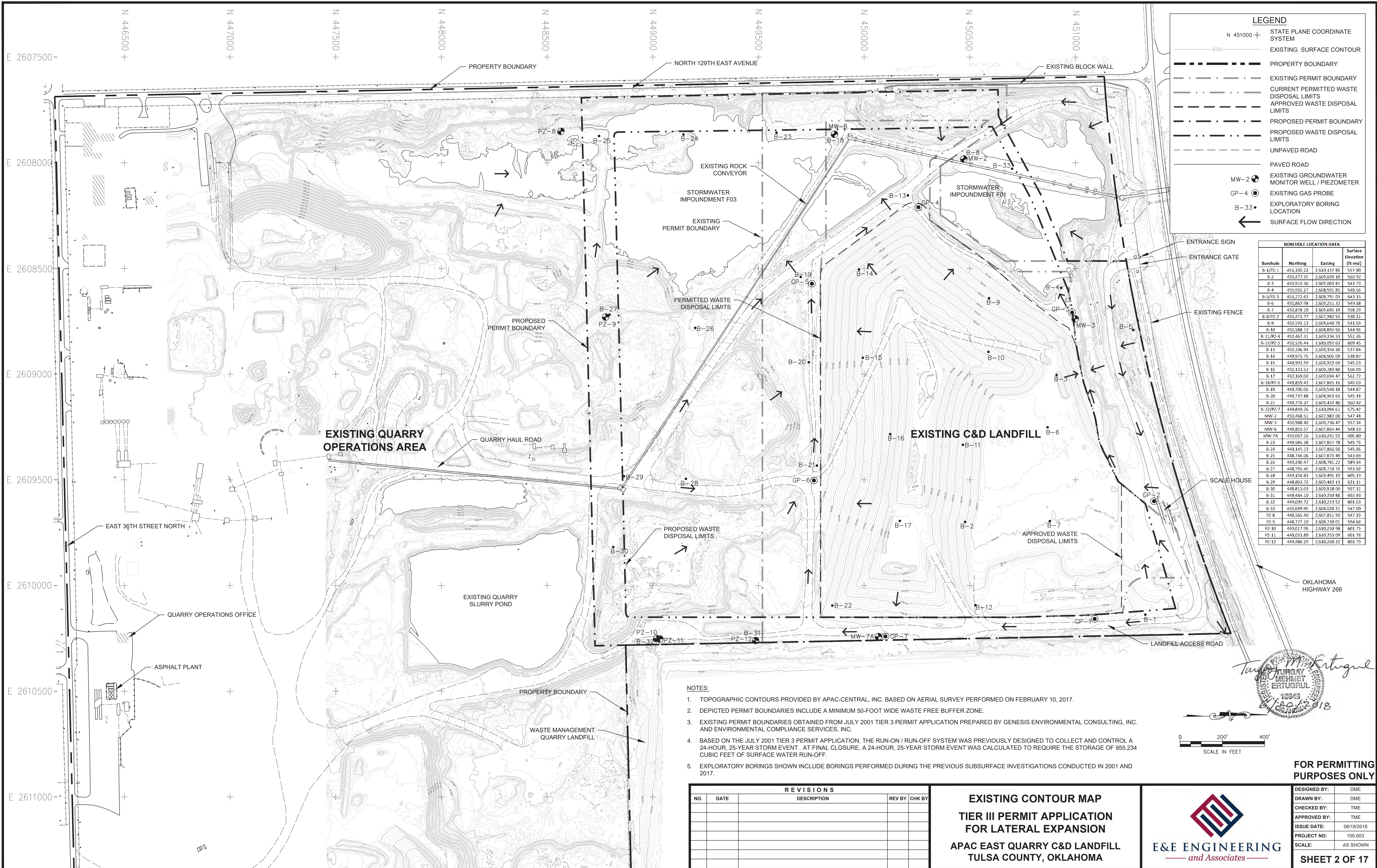


VICINITY MAP

MINGO QUADRANGLE  
T. 20 N., R. 14 E., SECTION 16  
TULSA COUNTY, OKLAHOMA  
7.5 MINUTE SERIES TOPOGRAPHIC MAP







**LEGEND**

N 451000 + STATE PLANE COORDINATE SYSTEM

600' EXISTING SURFACE CONTOUR

PROPERTY BOUNDARY

EXISTING PERMIT BOUNDARY

CURRENT PERMITTED WASTE DISPOSAL LIMITS

APPROVED WASTE DISPOSAL LIMITS

PROPOSED PERMIT BOUNDARY

PROPOSED WASTE DISPOSAL LIMITS

UNPAVED ROAD

PAVED ROAD

MW-2 EXISTING GROUNDWATER MONITOR WELL / PIEZOMETER

GP-4 EXISTING GAS PROBE

B-33 EXPLORATORY BORING LOCATION

← SURFACE FLOW DIRECTION

**BOREHOLE LOCATION DATA**

Borehole	Northing	Easting	Surface Elevation (ft. msl)
B-1/PZ-1	451,330.22	2,610,137.86	557.90
B-2	450,477.55	2,609,699.10	560.92
B-3	450,910.36	2,609,003.87	543.73
B-4	450,932.27	2,608,591.85	548.06
B-5/PZ-3	451,272.63	2,608,791.05	643.15
B-6	450,867.98	2,609,231.32	549.38
B-7	450,878.19	2,609,099.19	558.29
B-8/PZ-2	450,471.77	2,607,982.55	538.31
B-9	450,591.13	2,608,640.70	541.59
B-10	450,588.13	2,608,894.56	544.96
B-11/PZ-4	450,467.31	2,609,334.33	552.36
B-12/PZ-5	450,526.44	2,610,092.62	609.45
B-13	450,206.94	2,608,154.30	537.84
B-14	449,975.75	2,608,505.09	538.87
B-15	449,993.59	2,608,922.69	545.03
B-16	450,123.52	2,609,289.80	556.09
B-17	450,169.00	2,609,694.47	562.72
B-18/PZ-6	449,859.43	2,607,855.16	540.03
B-19	449,700.06	2,608,540.18	544.87
B-20	449,737.88	2,608,943.65	545.18
B-21	449,776.37	2,609,432.40	560.42
B-22/PZ-7	449,849.26	2,610,094.61	575.42
MW-2	450,468.51	2,607,982.00	547.48
MW-3	450,988.40	2,608,736.47	557.34
MW-4	449,855.57	2,607,854.44	548.33
MW-7A	450,657.16	2,610,241.55	606.80
B-23	449,585.18	2,607,857.78	545.76
B-24	449,145.13	2,607,855.50	545.96
B-25	448,746.06	2,607,873.49	543.69
B-26	449,200.47	2,608,781.22	589.34
B-27	448,735.45	2,608,718.76	593.92
B-28	449,156.83	2,609,495.19	605.13
B-29	448,863.72	2,609,483.13	621.11
B-30	448,813.03	2,609,818.09	597.31
B-31	449,484.10	2,610,250.88	602.93
B-32	449,099.72	2,610,233.52	601.03
B-33	450,699.56	2,608,028.21	547.00
PZ-8	448,565.40	2,607,851.59	547.33
PZ-9	448,777.10	2,608,730.01	594.68
PZ-10	449,017.96	2,610,250.98	601.75
PZ-11	449,033.89	2,610,253.09	601.78
PZ-12	449,486.29	2,610,260.32	603.79

- NOTES:**
- TOPOGRAPHIC CONTOURS PROVIDED BY APAC-CENTRAL, INC. BASED ON AERIAL SURVEY PERFORMED ON FEBRUARY 10, 2017.
  - DEPICTED PERMIT BOUNDARIES INCLUDE A MINIMUM 50-FOOT WIDE WASTE FREE BUFFER ZONE.
  - EXISTING PERMIT BOUNDARIES OBTAINED FROM JULY 2001 TIER 3 PERMIT APPLICATION PREPARED BY GENESIS ENVIRONMENTAL CONSULTING, INC. AND ENVIRONMENTAL COMPLIANCE SERVICES, INC.
  - BASED ON THE JULY 2001 TIER 3 PERMIT APPLICATION, THE RUN-ON / RUN-OFF SYSTEM WAS PREVIOUSLY DESIGNED TO COLLECT AND CONTROL A 24-HOUR, 25-YEAR STORM EVENT. AT FINAL CLOSURE, A 24-HOUR, 25-YEAR STORM EVENT WAS CALCULATED TO REQUIRE THE STORAGE OF 955,234 CUBIC FEET OF SURFACE WATER RUN-OFF.
  - EXPLORATORY BORINGS SHOWN INCLUDE BORINGS PERFORMED DURING THE PREVIOUS SUBSURFACE INVESTIGATIONS CONDUCTED IN 2001 AND 2017.

**REVISIONS**

NO.	DATE	DESCRIPTION	REV BY	CHK BY

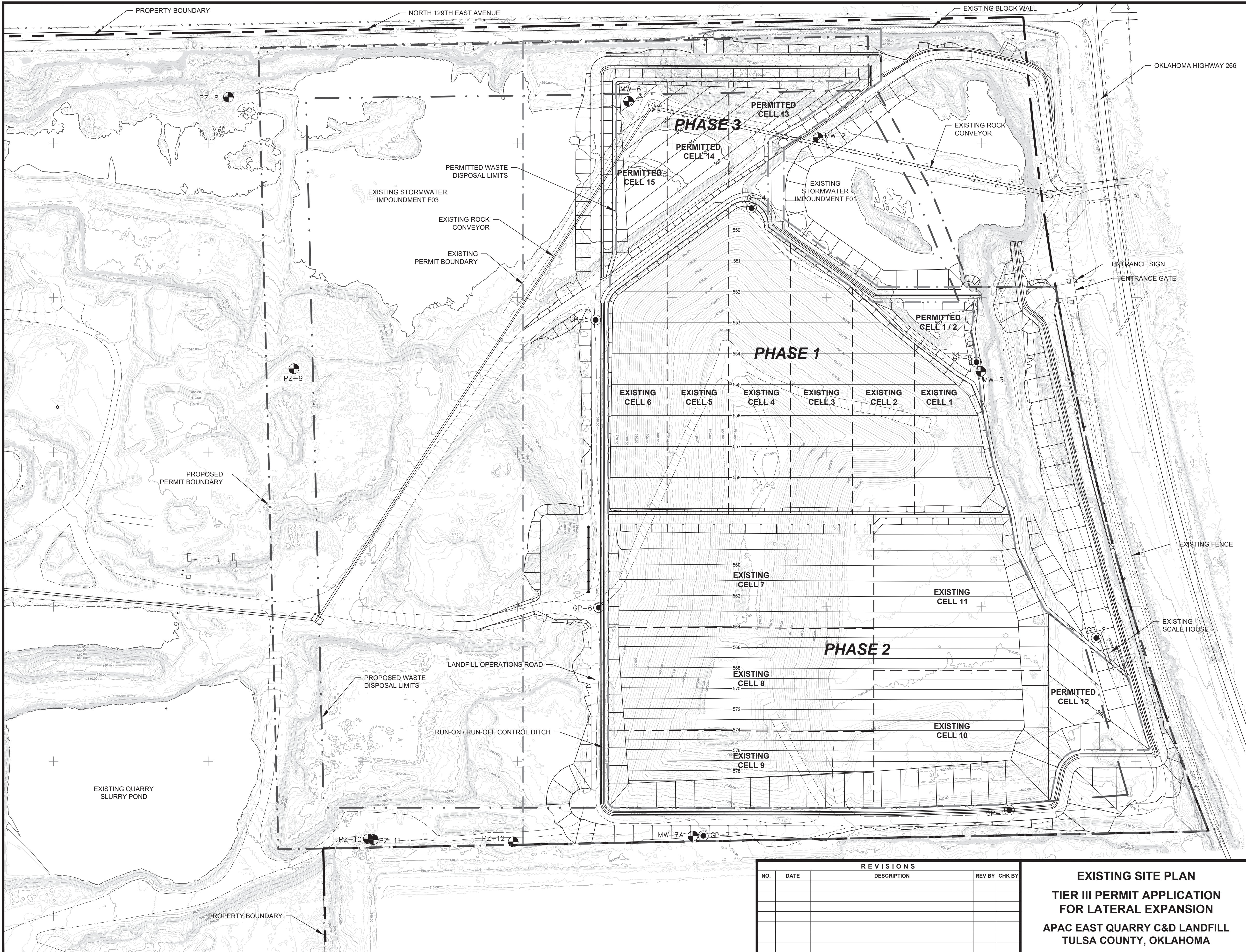
**EXISTING CONTOUR MAP  
TIER III PERMIT APPLICATION  
FOR LATERAL EXPANSION  
APAC EAST QUARRY C&D LANDFILL  
TULSA COUNTY, OKLAHOMA**

**E&E ENGINEERING  
and Associates**

**FOR PERMITTING PURPOSES ONLY**

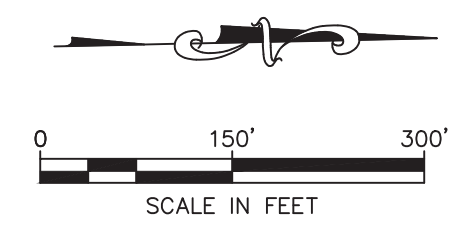
DESIGNED BY:	DME
DRAWN BY:	DME
CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/18/2018
PROJECT NO:	105-003
SCALE:	AS SHOWN

**SHEET 2 OF 17**



**LEGEND**

- — — — — PROPERTY BOUNDARY
- - - - - EXISTING PERMIT BOUNDARY
- - - - - CURRENT PERMITTED WASTE DISPOSAL LIMITS
- - - - - PERMITTED CELL BOUNDARY
- - - - - PROPOSED PERMIT BOUNDARY
- - - - - PROPOSED WASTE DISPOSAL LIMITS
- 600 EXISTING SURFACE CONTOUR
- 600 PERMITTED TOP OF CLAY CONTOUR
- - - - - UNPAVED ROAD
- PAVED ROAD
- MW-2 EXISTING GROUNDWATER MONITOR WELL / PIEZOMETER
- GP-4 EXISTING GAS PROBE



- NOTES:**
- TOPOGRAPHIC CONTOURS PROVIDED BY APAC-CENTRAL, INC. BASED ON AERIAL SURVEY PERFORMED ON FEBRUARY 10, 2017.
  - THE LANDFILL CONFIGURATION DEPICTED REFLECTS THE APPROVED PERMIT DESIGN BASED ON THE INITIAL PERMIT APPLICATION AND SUBSEQUENT PERMIT MODIFICATIONS.
  - CELLS 1-11 HAVE BEEN CONSTRUCTED TO DATE AND ARE ACTIVE.
  - EXISTING PERMIT BOUNDARIES OBTAINED FROM JULY 2001 TIER 3 PERMIT APPLICATION PREPARED BY GENESIS ENVIRONMENTAL CONSULTING, INC. AND ENVIRONMENTAL COMPLIANCE SERVICES, INC.
  - DEPICTED PERMIT BOUNDARIES INCLUDE A MINIMUM 50-FOOT WIDE WASTE FREE BUFFER ZONE.
  - EQL IS APPROVED TO PERFORM RECYCLING OPERATIONS IN THE AREA BETWEEN THE SCALE HOUSE AND EXISTING CELLS 10 AND 11 AS DEPICTED AND OUTLINED IN THE CURRENT RECYCLING PLAN.
  - STORMWATER IMPOUNDMENTS F01 AND F03 SERVE THE QUARRY AND LANDFILL OPERATIONS. WATER IS USED / RECYCLED BY QUARRY OPERATIONS ON A REGULAR BASIS. IN THE EVENT THAT THE DISCHARGE OF EXCESS STORMWATER NECESSARY, IT IS PUMPED TO PERMITTED OUTFALL 001 NORTH OF OKLAHOMA HIGHWAY 266 AS AUTHORIZED BY OPDES PERMIT NO. OK0043001.
  - BASED ON THE JULY 2001 TIER 3 PERMIT APPLICATION, THE RUN-ON / RUN-OFF SYSTEM WAS PREVIOUSLY DESIGNED TO COLLECT AND CONTROL A 24-HOUR, 25-YEAR STORM EVENT. AT FINAL CLOSURE, A 24-HOUR, 25-YEAR STORM EVENT WAS CALCULATED TO REQUIRE THE STORAGE OF 955,234 CUBIC FEET OF SURFACE WATER RUN-OFF.
  - SOIL BORROW SOURCES LOCATED ON ADJACENT APAC PROPERTY ARE UTILIZED FOR CELL CONSTRUCTION.

**EXISTING MONITORING WELL AND GAS PROBE DATA**

Well	Northing	Easting	Surface Elevation (ft-msl)	Top of Casing Elevation (ft-msl)
MW-2	450,468.51	2,607,982.00	547.48	552.63
MW-3	450,988.40	2,608,736.47	557.34	558.84
MW-6	449,855.57	2,607,864.44	548.33	552.61
MW-7A	450,067.16	2,610,241.55	606.80	610.28
GP-1	451,090.75	2,610,157.44	622.61	626.02
GP-2	450,371.45	2,609,600.99	604.08	606.75
GP-3	450,984.16	2,608,708.53	556.23	558.94
GP-4	450,256.64	2,608,210.03	560.15	563.15
GP-5	449,752.95	2,608,720.06	558.00	560.57
GP-6	449,762.18	2,609,503.19	570.09	572.96
GP-7	450,086.77	2,610,242.90	606.06	608.82

*Turgay M. Kartugul*  
 Turgay M. Kartugul  
 MEHMET ERTUGRUL  
 16943  
 2018

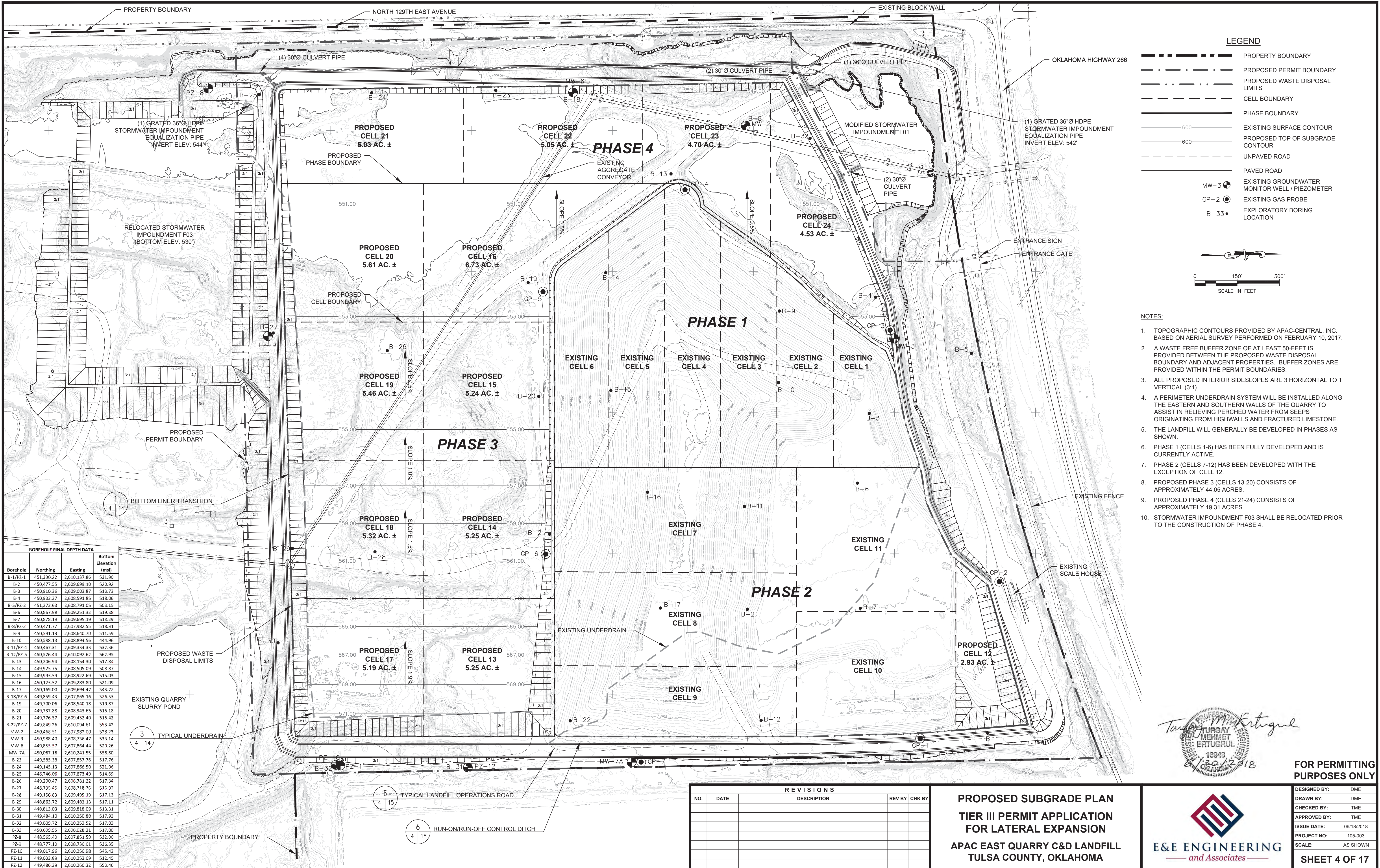
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REVISIONS				
NO.	DATE	DESCRIPTION	REV BY	CHK BY

**EXISTING SITE PLAN  
 TIER III PERMIT APPLICATION  
 FOR LATERAL EXPANSION  
 APAC EAST QUARRY C&D LANDFILL  
 TULSA COUNTY, OKLAHOMA**

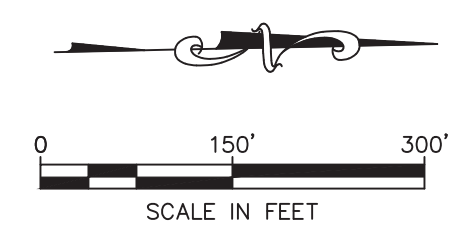


DESIGNED BY:	DME
DRAWN BY:	DME
CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/20/2018
PROJECT NO:	105-003
SCALE:	AS SHOWN



**LEGEND**

- PROPERTY BOUNDARY
- - - - - PROPOSED PERMIT BOUNDARY
- - - - - PROPOSED WASTE DISPOSAL LIMITS
- - - - - CELL BOUNDARY
- - - - - PHASE BOUNDARY
- 600 --- EXISTING SURFACE CONTOUR
- 600 --- PROPOSED TOP OF SUBGRADE CONTOUR
- - - - - UNPAVED ROAD
- PAVED ROAD
- MW-3 ● EXISTING GROUNDWATER MONITOR WELL / PIEZOMETER
- GP-2 ● EXISTING GAS PROBE
- B-33 ● EXPLORATORY BORING LOCATION



**NOTES:**

1. TOPOGRAPHIC CONTOURS PROVIDED BY APAC-CENTRAL, INC. BASED ON AERIAL SURVEY PERFORMED ON FEBRUARY 10, 2017.
2. A WASTE FREE BUFFER ZONE OF AT LEAST 50-FEET IS PROVIDED BETWEEN THE PROPOSED WASTE DISPOSAL BOUNDARY AND ADJACENT PROPERTIES. BUFFER ZONES ARE PROVIDED WITHIN THE PERMIT BOUNDARIES.
3. ALL PROPOSED INTERIOR SIDESLOPES ARE 3 HORIZONTAL TO 1 VERTICAL (3:1).
4. A PERIMETER UNDERDRAIN SYSTEM WILL BE INSTALLED ALONG THE EASTERN AND SOUTHERN WALLS OF THE QUARRY TO ASSIST IN RELIEVING PERCHED WATER FROM SEEPS ORIGINATING FROM HIGHWALLS AND FRACTURED LIMESTONE.
5. THE LANDFILL WILL GENERALLY BE DEVELOPED IN PHASES AS SHOWN.
6. PHASE 1 (CELLS 1-6) HAS BEEN FULLY DEVELOPED AND IS CURRENTLY ACTIVE.
7. PHASE 2 (CELLS 7-12) HAS BEEN DEVELOPED WITH THE EXCEPTION OF CELL 12.
8. PROPOSED PHASE 3 (CELLS 13-20) CONSISTS OF APPROXIMATELY 44.05 ACRES.
9. PROPOSED PHASE 4 (CELLS 21-24) CONSISTS OF APPROXIMATELY 19.31 ACRES.
10. STORMWATER IMPOUNDMENT F03 SHALL BE RELOCATED PRIOR TO THE CONSTRUCTION OF PHASE 4.

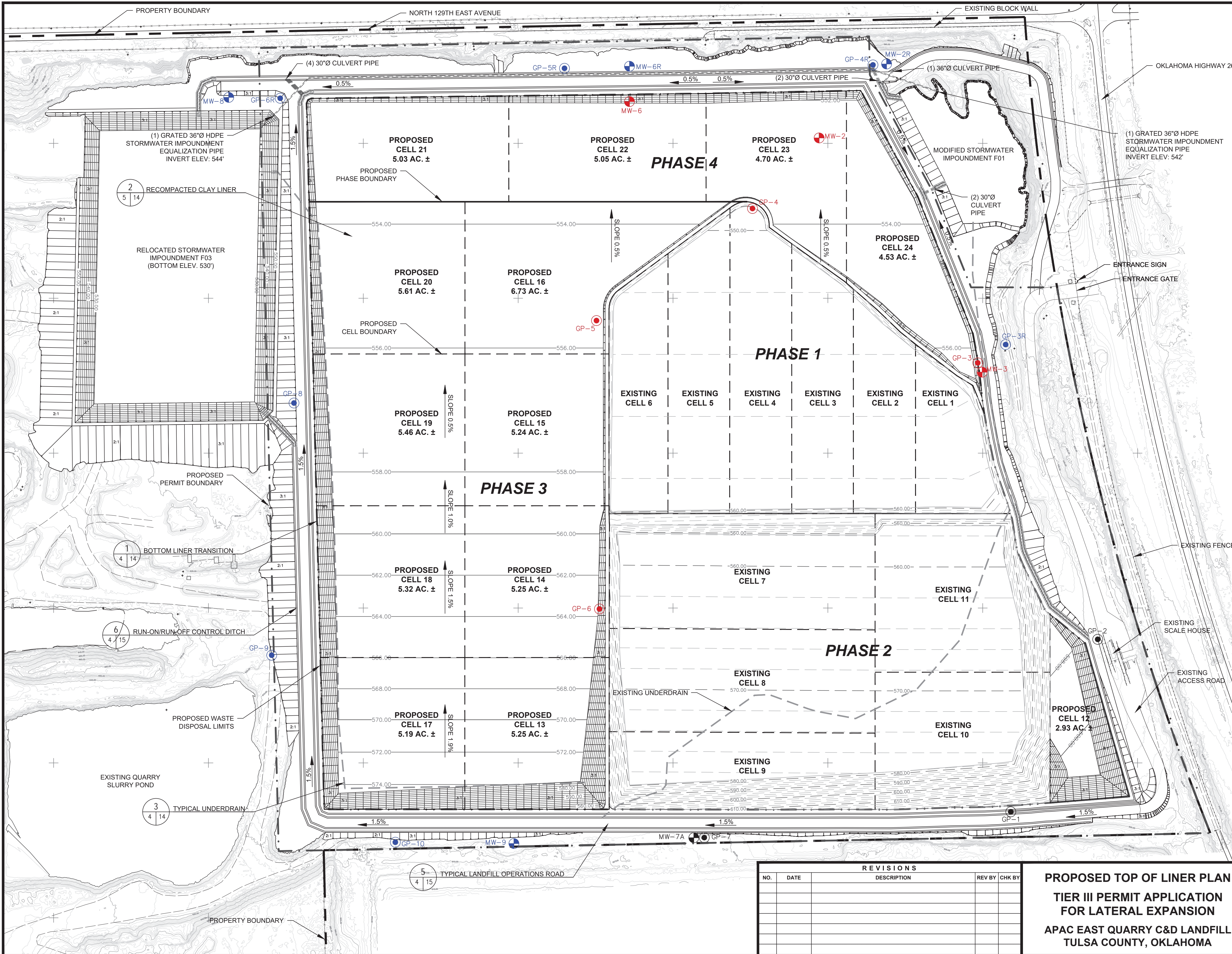
BOREHOLE FINAL DEPTH DATA			
Borehole	Northing	Easting	Bottom Elevation (msl)
B-1/PZ-1	451,330.22	2,610,137.86	531.90
B-2	450,477.55	2,609,699.10	520.52
B-3	450,910.36	2,609,003.87	513.73
B-4	450,932.27	2,608,591.85	518.06
B-5/PZ-3	451,272.63	2,608,791.05	503.15
B-6	450,867.98	2,609,251.32	519.39
B-7	450,878.19	2,609,695.19	518.29
B-8/PZ-2	450,471.77	2,607,982.55	518.31
B-9	450,591.13	2,608,640.70	511.59
B-10	450,588.13	2,608,894.56	444.86
B-11/PZ-4	450,467.31	2,609,334.33	532.36
B-12/PZ-5	450,526.44	2,610,092.62	562.95
B-13	450,206.94	2,608,154.30	517.84
B-14	449,975.75	2,608,505.09	508.87
B-15	449,993.59	2,608,922.69	515.03
B-16	450,123.52	2,609,283.80	521.09
B-17	450,169.00	2,609,694.47	543.72
B-18/PZ-6	449,859.43	2,607,865.16	526.53
B-19	449,700.06	2,608,540.18	519.87
B-20	449,737.88	2,608,943.65	515.18
B-21	449,776.37	2,609,432.40	515.42
B-22/PZ-7	449,849.26	2,610,094.61	553.42
MW-2	450,468.51	2,607,982.00	528.23
MW-3	450,998.40	2,608,736.47	523.16
MW-6	449,855.57	2,607,856.44	529.26
MW-7A	450,067.16	2,610,241.55	556.80
B-23	449,585.38	2,607,857.78	517.76
B-24	449,145.13	2,607,866.50	521.98
B-25	448,746.06	2,607,873.49	514.69
B-26	449,200.47	2,608,781.22	517.34
B-27	448,795.45	2,608,718.76	516.92
B-28	449,156.83	2,609,495.19	517.13
B-29	448,863.72	2,609,483.13	517.11
B-30	448,813.03	2,609,818.09	513.31
B-31	449,484.10	2,610,250.88	517.93
B-32	449,009.72	2,610,253.52	517.03
B-33	450,699.55	2,608,028.21	517.00
PZ-8	448,565.40	2,607,851.59	532.00
PZ-9	448,777.10	2,608,730.01	536.35
PZ-10	449,017.96	2,610,250.98	546.42
PZ-11	449,033.89	2,610,253.09	512.45
PZ-12	449,486.29	2,610,260.32	553.46

REVISIONS				
NO.	DATE	DESCRIPTION	REV BY	CHK BY

**PROPOSED SUBGRADE PLAN  
TIER III PERMIT APPLICATION  
FOR LATERAL EXPANSION  
APAC EAST QUARRY C&D LANDFILL  
TULSA COUNTY, OKLAHOMA**

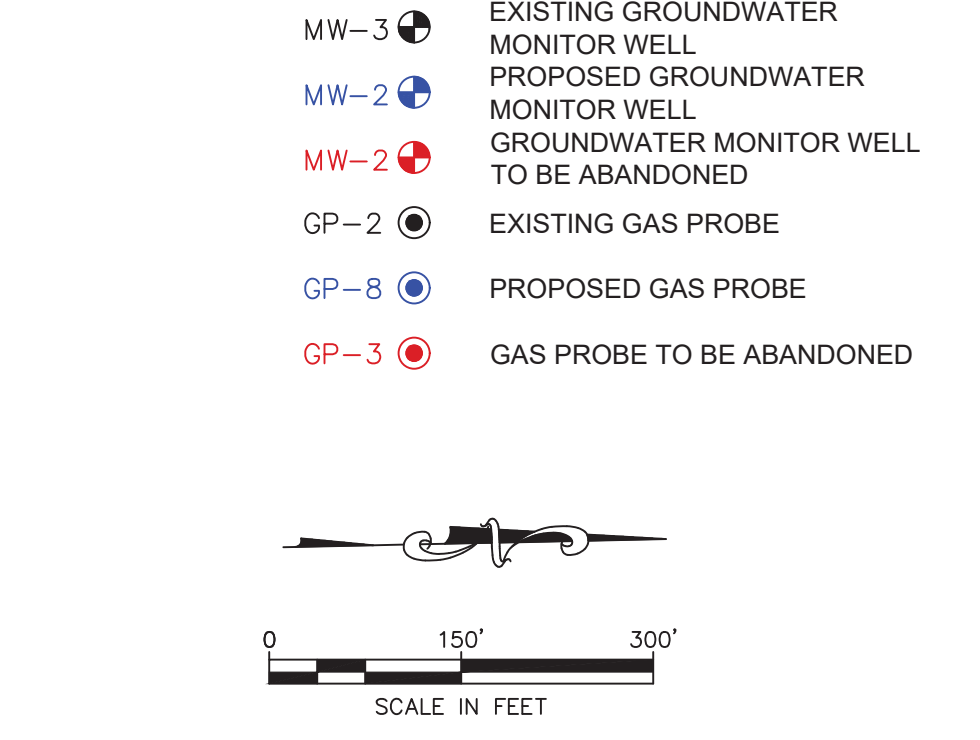


DESIGNED BY:	DME
DRAWN BY:	DME
CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/18/2018
PROJECT NO.:	105-003
SCALE:	AS SHOWN
<b>SHEET 4 OF 17</b>	



**LEGEND**

	PROPERTY BOUNDARY
	PROPOSED PERMIT BOUNDARY
	PROPOSED WASTE DISPOSAL LIMITS
	CELL BOUNDARY
	PHASE BOUNDARY
	EXISTING SURFACE CONTOUR
	PROPOSED TOP OF LINER CONTOUR
	AS-BUILT TOP OF LINER CONTOUR
	UNPAVED ROAD
	PAVED ROAD
	EXISTING GROUNDWATER MONITOR WELL
	PROPOSED GROUNDWATER MONITOR WELL
	GROUNDWATER MONITOR WELL TO BE ABANDONED
	EXISTING GAS PROBE
	PROPOSED GAS PROBE
	GAS PROBE TO BE ABANDONED



- NOTES:**
- TOPOGRAPHIC CONTOURS PROVIDED BY APAC-CENTRAL, INC. BASED ON AERIAL SURVEY PERFORMED ON FEBRUARY 10, 2017.
  - AS-BUILT TOP OF CLAY LINER CONTOURS BASED ON CONSTRUCTION DRAWINGS AND AS-BUILT SURVEY RECORDS FOR EACH CELL.
  - A WASTE FREE BUFFER ZONE OF AT LEAST 50-FEET IS PROVIDED BETWEEN THE PROPOSED WASTE DISPOSAL BOUNDARY AND ADJACENT PROPERTIES. BUFFER ZONES ARE PROVIDED WITHIN THE PERMIT BOUNDARIES.
  - ALL PROPOSED INTERIOR SIDESLOPES ARE 3 HORIZONTAL TO 1 VERTICAL (3:1).
  - A PERIMETER UNDERDRAIN SYSTEM WILL BE INSTALLED ALONG THE EASTERN AND SOUTHERN WALLS OF THE QUARRY TO ASSIST IN RELIEVING PERCHED WATER FROM SEEPS ORIGINATING FROM HIGHWALLS AND FRACTURED LIMESTONE.
  - RECOMPACTED CLAY LINER SHALL BE 36" THICK AND HAVE A MAXIMUM HYDRAULIC CONDUCTIVITY OF  $1.0 \times 10^{-5}$  CM/SEC.
  - PROPOSED TOP OF CLAY LINER ELEVATIONS MAINTAIN A MINIMUM SEPARATION DISTANCE OF 5 FEET BETWEEN THE TOP OF THE CLAY LINER AND THE SEASONAL HIGH GROUNDWATER POTENTIOMETRIC SURFACE AS ESTABLISHED IN THE 2018 SUBSURFACE INVESTIGATION AND GROUNDWATER STUDY REPORT.
  - A 12" PROTECTIVE COVER LAYER WILL BE PLACED OVER THE COMPLETED CLAY LINER.
  - THE LANDFILL WILL GENERALLY BE DEVELOPED IN PHASES AS SHOWN.
  - PHASE 1 (CELLS 1-6) HAS BEEN FULLY DEVELOPED AND IS CURRENTLY ACTIVE.
  - PHASE 2 (CELLS 7-12) HAS BEEN DEVELOPED WITH THE EXCEPTION OF CELL 12.
  - PROPOSED PHASE 3 (CELLS 13-21) CONSISTS OF APPROXIMATELY 44.05 ACRES.
  - PROPOSED PHASE 4 (CELLS 21-24) CONSISTS OF APPROXIMATELY 19.31 ACRES.
  - STORMWATER IMPOUNDMENT F03 SHALL BE RELOCATED PRIOR TO THE CONSTRUCTION OF PHASE 4.

*Tayfun M. Kartugrul*  
 TAYFUN MEHMET ERTUGRUL  
 10949  
 2022-01-18

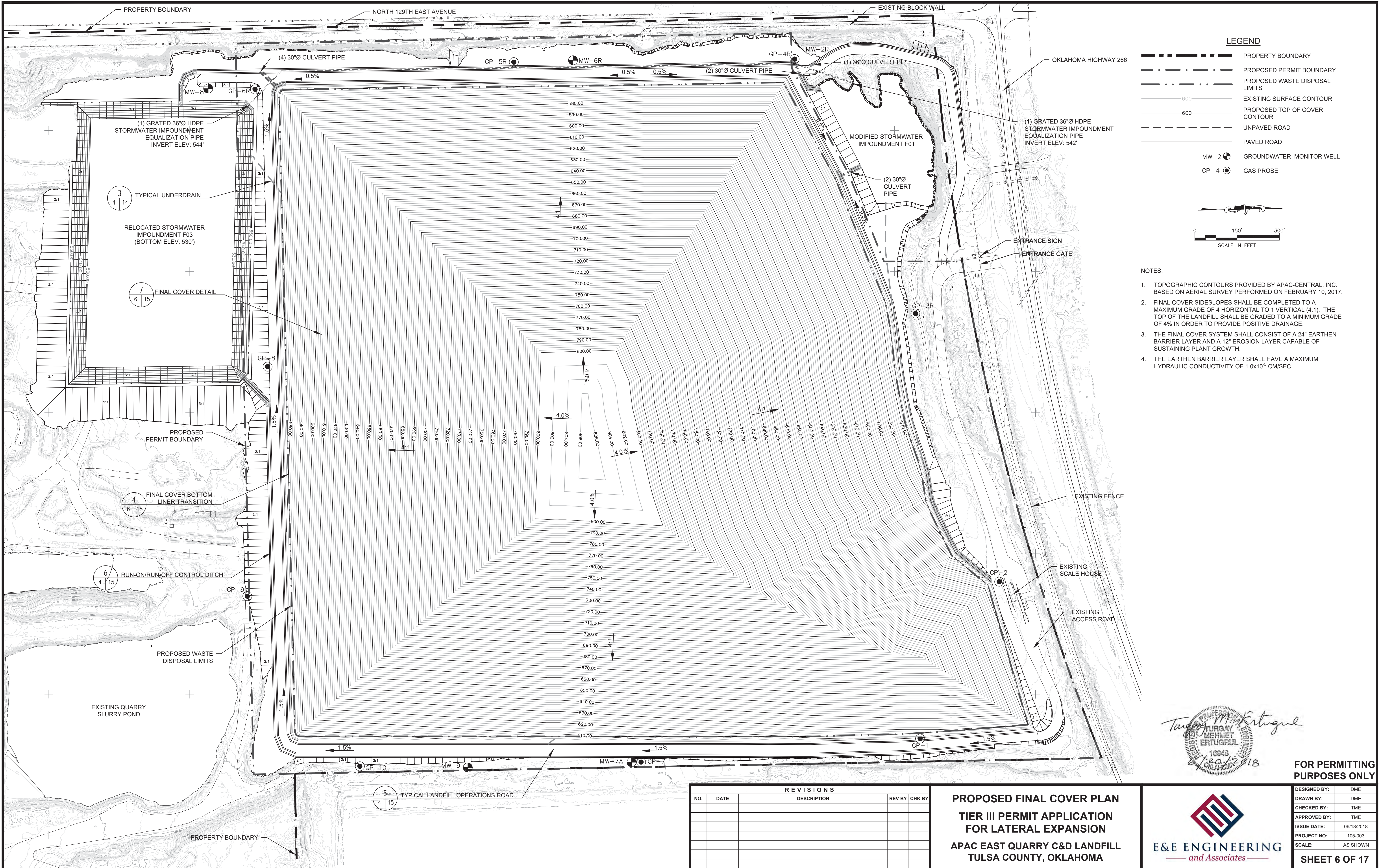
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REVISIONS				
NO.	DATE	DESCRIPTION	REV BY	CHK BY

**PROPOSED TOP OF LINER PLAN  
 TIER III PERMIT APPLICATION  
 FOR LATERAL EXPANSION  
 APAC EAST QUARRY C&D LANDFILL  
 TULSA COUNTY, OKLAHOMA**



DESIGNED BY:	DME
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**LEGEND**

- PROPERTY BOUNDARY
- - - PROPOSED PERMIT BOUNDARY
- - - PROPOSED WASTE DISPOSAL LIMITS
- 600 --- EXISTING SURFACE CONTOUR
- 600 --- PROPOSED TOP OF COVER CONTOUR
- - - UNPAVED ROAD
- PAVED ROAD
- MW-2 --- GROUNDWATER MONITOR WELL
- GP-4 --- GAS PROBE

SCALE IN FEET  
0 150 300

- NOTES:**
1. TOPOGRAPHIC CONTOURS PROVIDED BY APAC-CENTRAL, INC. BASED ON AERIAL SURVEY PERFORMED ON FEBRUARY 10, 2017.
  2. FINAL COVER SIDESLOPES SHALL BE COMPLETED TO A MAXIMUM GRADE OF 4 HORIZONTAL TO 1 VERTICAL (4:1). THE TOP OF THE LANDFILL SHALL BE GRADED TO A MINIMUM GRADE OF 4% IN ORDER TO PROVIDE POSITIVE DRAINAGE.
  3. THE FINAL COVER SYSTEM SHALL CONSIST OF A 24" EARTHEN BARRIER LAYER AND A 12" EROSION LAYER CAPABLE OF SUSTAINING PLANT GROWTH.
  4. THE EARTHEN BARRIER LAYER SHALL HAVE A MAXIMUM HYDRAULIC CONDUCTIVITY OF  $1.0 \times 10^{-5}$  CM/SEC.

*Tayfun M. Kartugul*  
 MEHMET ERTUGRUL  
 10343  
 12-01-2018

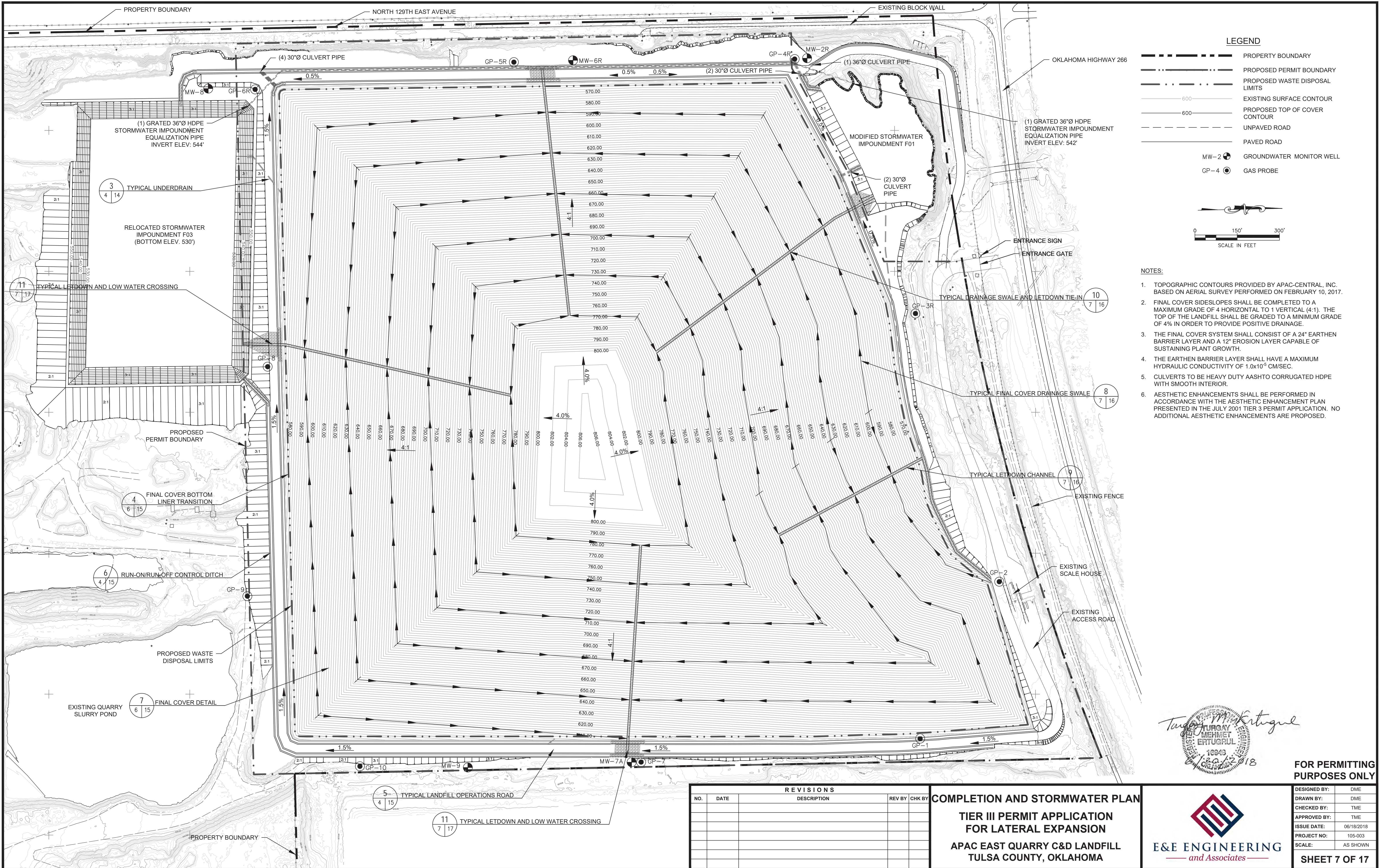
**FOR PERMITTING PURPOSES ONLY**

REVISIONS				
NO.	DATE	DESCRIPTION	REV BY	CHK BY

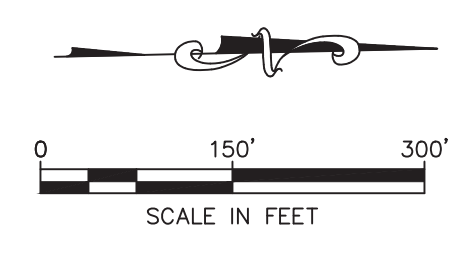
**PROPOSED FINAL COVER PLAN  
 TIER III PERMIT APPLICATION  
 FOR LATERAL EXPANSION  
 APAC EAST QUARRY C&D LANDFILL  
 TULSA COUNTY, OKLAHOMA**



DESIGNED BY:	DME
DRAWN BY:	DME
CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/18/2018
PROJECT NO:	105-003
SCALE:	AS SHOWN



- LEGEND**
- PROPERTY BOUNDARY
  - - - PROPOSED PERMIT BOUNDARY
  - - - PROPOSED WASTE DISPOSAL LIMITS
  - 600 --- EXISTING SURFACE CONTOUR
  - 600 --- PROPOSED TOP OF COVER CONTOUR
  - - - UNPAVED ROAD
  - PAVED ROAD
  - MW-2 --- GROUNDWATER MONITOR WELL
  - GP-4 --- GAS PROBE



- NOTES:**
1. TOPOGRAPHIC CONTOURS PROVIDED BY APAC-CENTRAL, INC. BASED ON AERIAL SURVEY PERFORMED ON FEBRUARY 10, 2017.
  2. FINAL COVER SIDESLOPES SHALL BE COMPLETED TO A MAXIMUM GRADE OF 4 HORIZONTAL TO 1 VERTICAL (4:1). THE TOP OF THE LANDFILL SHALL BE GRADED TO A MINIMUM GRADE OF 4% IN ORDER TO PROVIDE POSITIVE DRAINAGE.
  3. THE FINAL COVER SYSTEM SHALL CONSIST OF A 24" EARTHEN BARRIER LAYER AND A 12" EROSION LAYER CAPABLE OF SUSTAINING PLANT GROWTH.
  4. THE EARTHEN BARRIER LAYER SHALL HAVE A MAXIMUM HYDRAULIC CONDUCTIVITY OF  $1.0 \times 10^{-5}$  CM/SEC.
  5. CULVERTS TO BE HEAVY DUTY AASHTO CORRUGATED HDPE WITH SMOOTH INTERIOR.
  6. AESTHETIC ENHANCEMENTS SHALL BE PERFORMED IN ACCORDANCE WITH THE AESTHETIC ENHANCEMENT PLAN PRESENTED IN THE JULY 2001 TIER 3 PERMIT APPLICATION. NO ADDITIONAL AESTHETIC ENHANCEMENTS ARE PROPOSED.

*Turgay Mehmet Ertugrul*  
**TURGAY MEHMET ERTUGRUL**  
 10943  
 06/18/2018

**FOR PERMITTING PURPOSES ONLY**

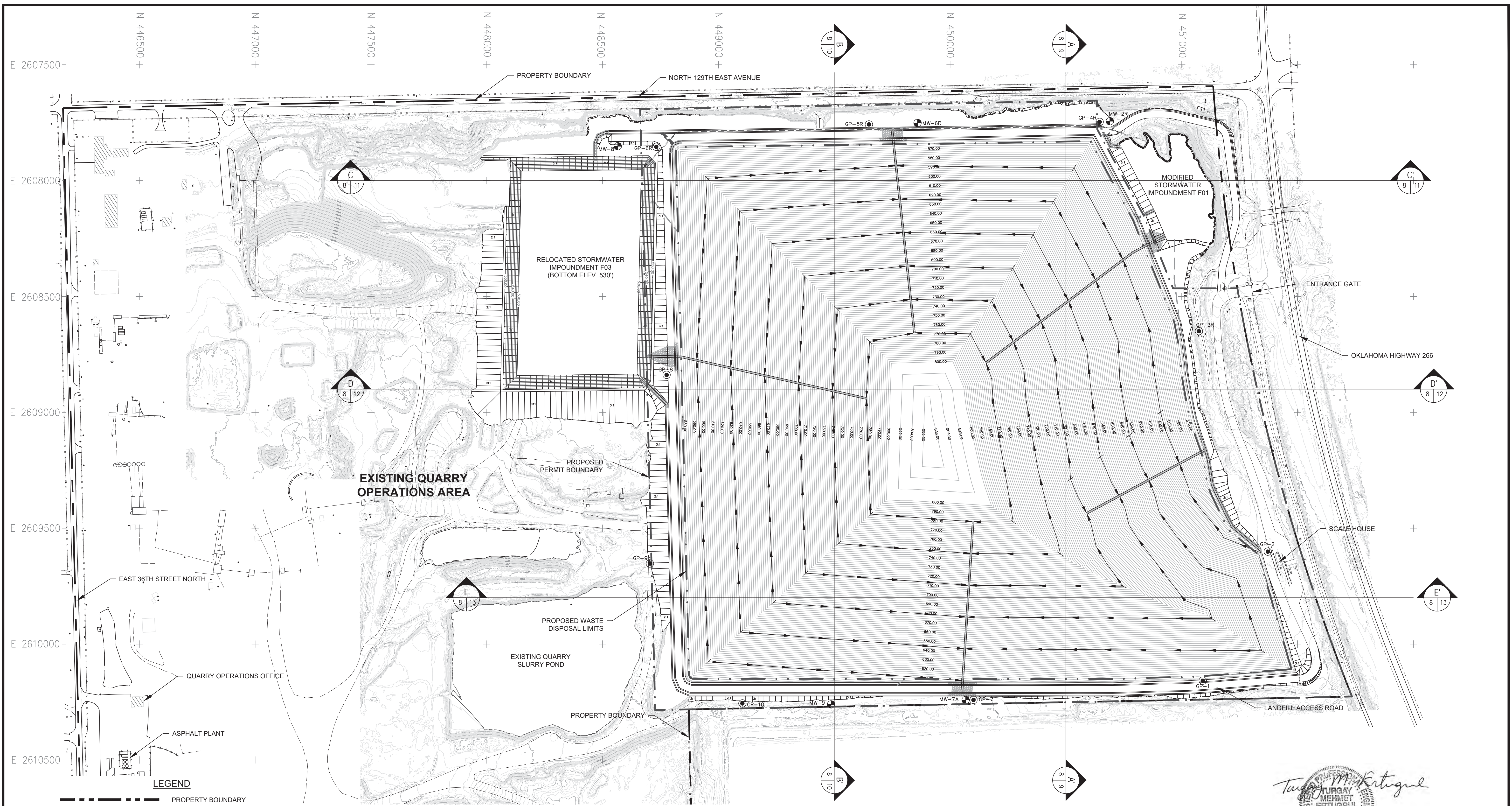
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NO.	DATE	DESCRIPTION	REV BY	CHK BY

**COMPLETION AND STORMWATER PLAN**  
**TIER III PERMIT APPLICATION FOR LATERAL EXPANSION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**



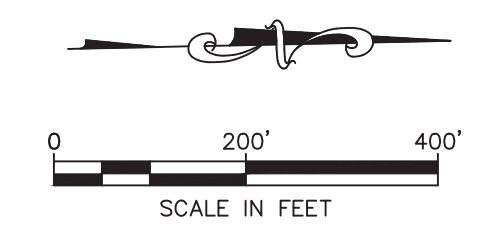
DESIGNED BY:	DME
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CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/18/2018
PROJECT NO:	105-003
SCALE:	AS SHOWN

**SHEET 7 OF 17**



**LEGEND**

- PROPERTY BOUNDARY
- - - PROPOSED PERMIT BOUNDARY
- - - PROPOSED WASTE DISPOSAL LIMITS
- 600 --- EXISTING SURFACE CONTOUR
- 600 --- PROPOSED ELEVATION CONTOUR
- - - UNPAVED ROAD
- PAVED ROAD
- MW-2 ● GROUNDWATER MONITOR WELL
- GP-4 ● GAS PROBE



**NOTES:**

1. TOPOGRAPHIC CONTOURS PROVIDED BY APAC-CENTRAL, INC. BASED ON AERIAL SURVEY PERFORMED ON FEBRUARY 10, 2017.

REVISIONS				
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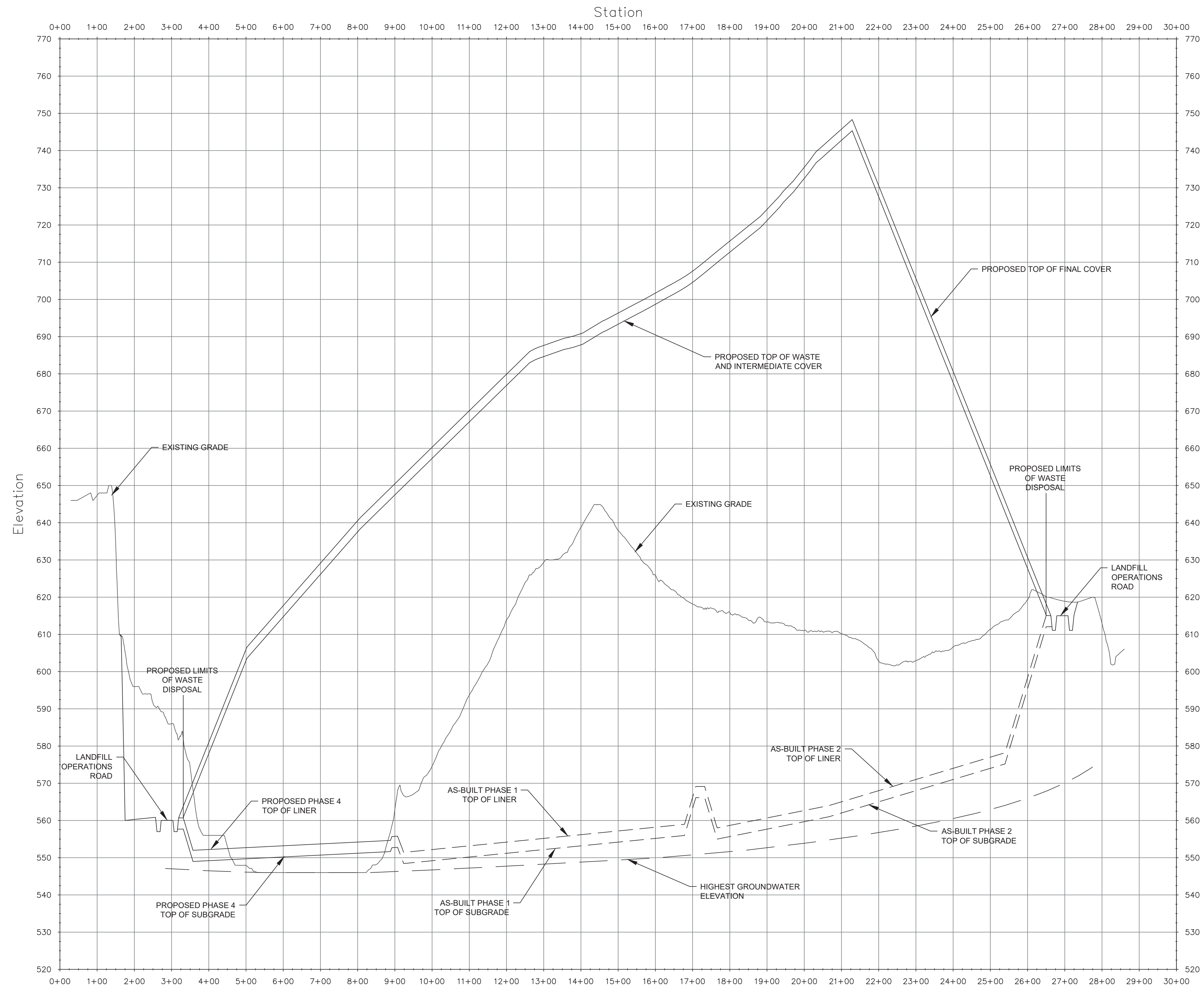
**CROSS-SECTION LOCATION MAP**  
**TIER III PERMIT APPLICATION**  
**FOR LATERAL EXPANSION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**

*Tayyip M. Kartigul*  
**TURKAY MEHMET ERTUGRUL**  
 10943  
 6/20/2018



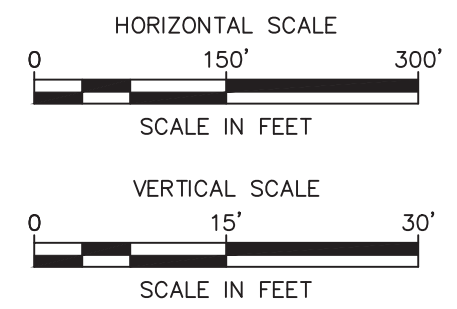
**FOR PERMITTING PURPOSES ONLY**

DESIGNED BY:	DME
DRAWN BY:	DME
CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/18/2018
PROJECT NO:	105-003
SCALE:	AS SHOWN



**LEGEND**

- EXISTING GRADE
- - - EXISTING APPROXIMATE WATER LEVEL
- - - HIGHEST GROUNDWATER LEVEL
- - - EXISTING AS-BUILT GRADE
- PROPOSED GRADE

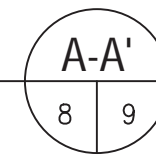


**NOTES:**

1. EXISTING GRADES BASED ON AERIAL SURVEY PERFORMED ON FEBRUARY 10, 2017 BY APAC-CENTRAL, INC.
2. CROSS SECTIONS LOCATIONS PROVIDED ON SHEET 8.
3. LINER DETAILS PROVIDED ON SHEET 14.
4. FINAL COVER DETAILS PROVIDED ON SHEET 15.
5. THE HIGHEST GROUNDWATER LEVELS SHOWN ARE BASED ON THE HIGHEST ELEVATIONS MEASURED WITHIN EACH PIEZOMETER / MONITORING WELL FROM JUNE 2016 THROUGH JULY 2017 AS PRESENTED IN THE JULY 2018 SUBSURFACE INVESTIGATION AND GROUNDWATER STUDY REPORT.

CROSS SECTION A-A'

DETAIL  
SCALE: AS SHOWN



REVISIONS				
NO.	DATE	DESCRIPTION	REV BY	CHK BY

**CROSS SECTION A-A'**  
**TIER III PERMIT APPLICATION**  
**FOR LATERAL EXPANSION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**

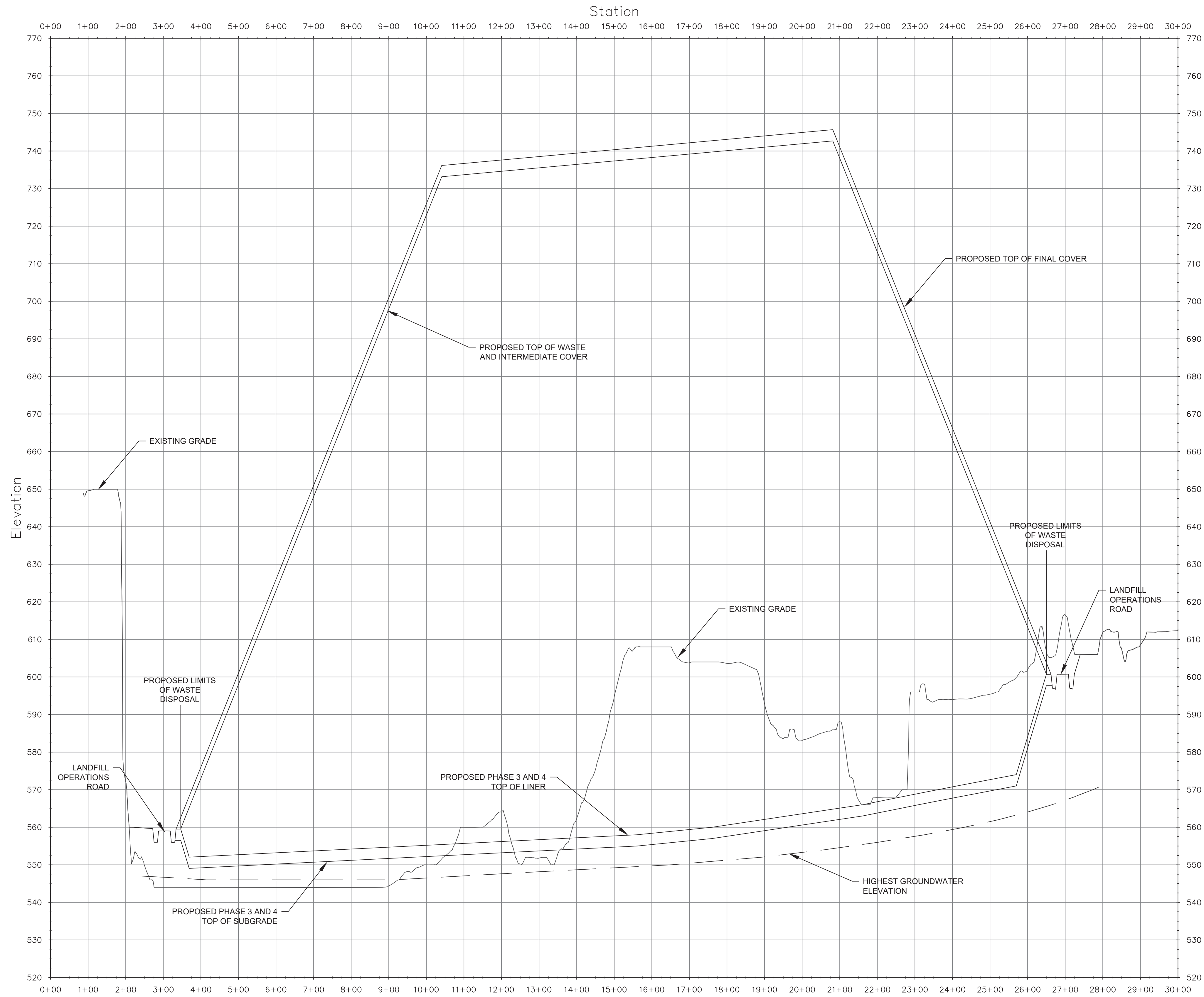
*Tugay M. Kartoglu*  
 TUGAY M. KARTOGLU  
 MEHMET ERTUGRUL  
 10943  
 06/18/2018



**FOR PERMITTING PURPOSES ONLY**

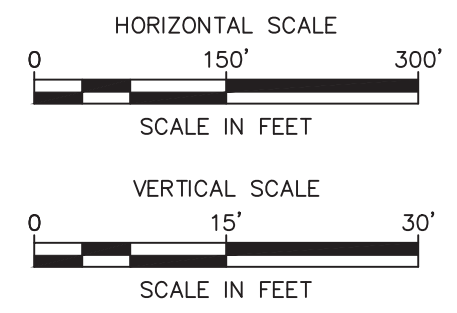
DESIGNED BY:	DME
DRAWN BY:	DME
CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/18/2018
PROJECT NO:	105-003
SCALE:	AS SHOWN





**LEGEND**

- EXISTING GRADE
- - - EXISTING APPROXIMATE WATER LEVEL
- HIGHEST GROUNDWATER LEVEL
- - - EXISTING AS-BUILT GRADE
- PROPOSED GRADE



**NOTES:**

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*Turgay M. Kartogul*  
 T. TURGAY  
 M. MEHMET  
 E. ERTUGRUL  
 10043  
 06/18/2018

CROSS SECTION B-B'

DETAIL  
 SCALE: AS SHOWN

B-B'  
 8 | 10

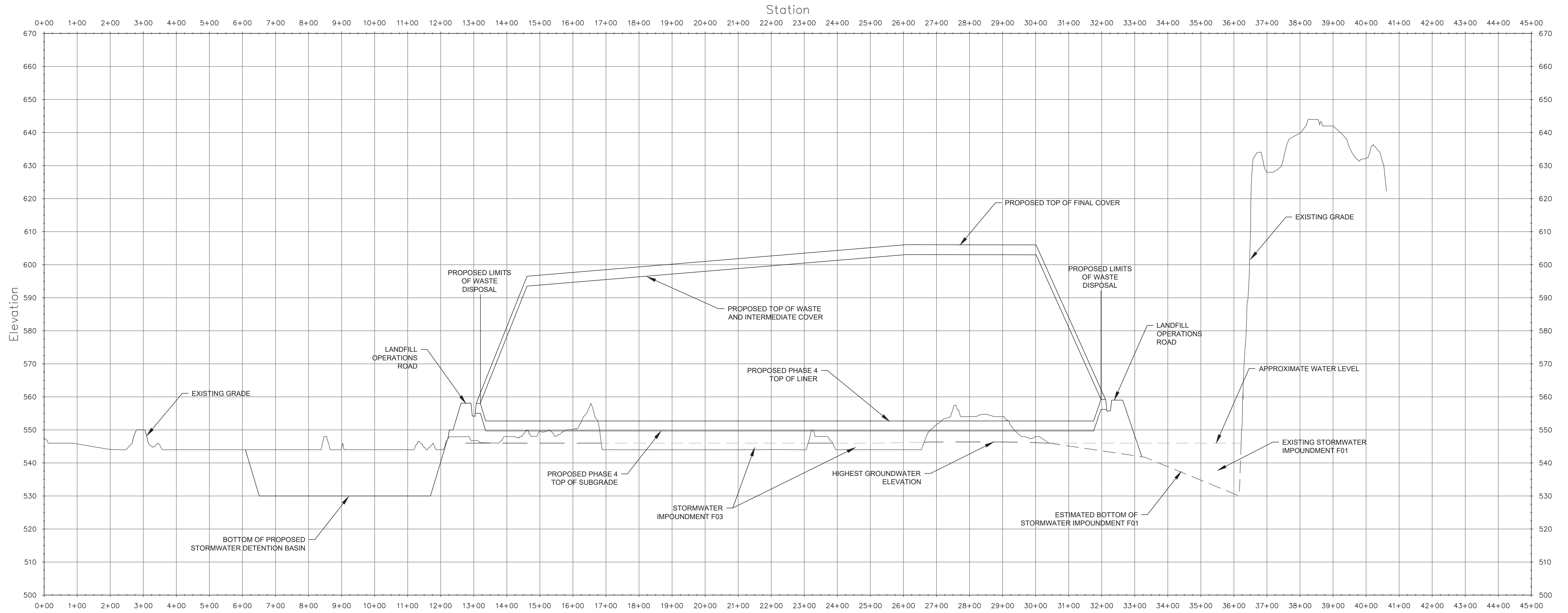
REVISIONS				
NO.	DATE	DESCRIPTION	REV BY	CHK BY

**CROSS SECTION B-B'**  
**TIER III PERMIT APPLICATION**  
**FOR LATERAL EXPANSION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**



**FOR PERMITTING PURPOSES ONLY**

DESIGNED BY:	DME
DRAWN BY:	DME
CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/18/2018
PROJECT NO:	105-003
SCALE:	AS SHOWN

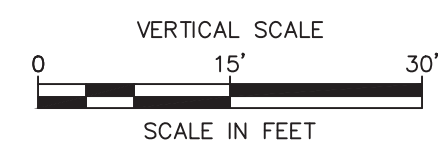
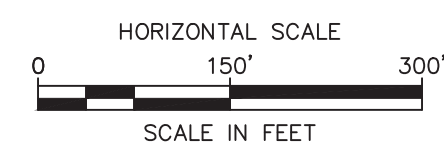


CROSS SECTION C-C'

DETAIL C-C'  
SCALE: AS SHOWN

LEGEND

- EXISTING GRADE
- - - - - EXISTING APPROXIMATE WATER LEVEL
- - - - - HIGHEST GROUNDWATER LEVEL
- - - - - EXISTING AS-BUILT GRADE
- PROPOSED GRADE



NOTES:

1. EXISTING GRADES BASED ON AERIAL SURVEY PERFORMED ON FEBRUARY 10, 2017 BY APAC-CENTRAL, INC.
2. CROSS SECTIONS LOCATIONS PROVIDED ON SHEET 8.
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*Turgay M. Ertugrul*  
TURGAY MEHMET ERTUGRUL  
10843  
06/20/2018

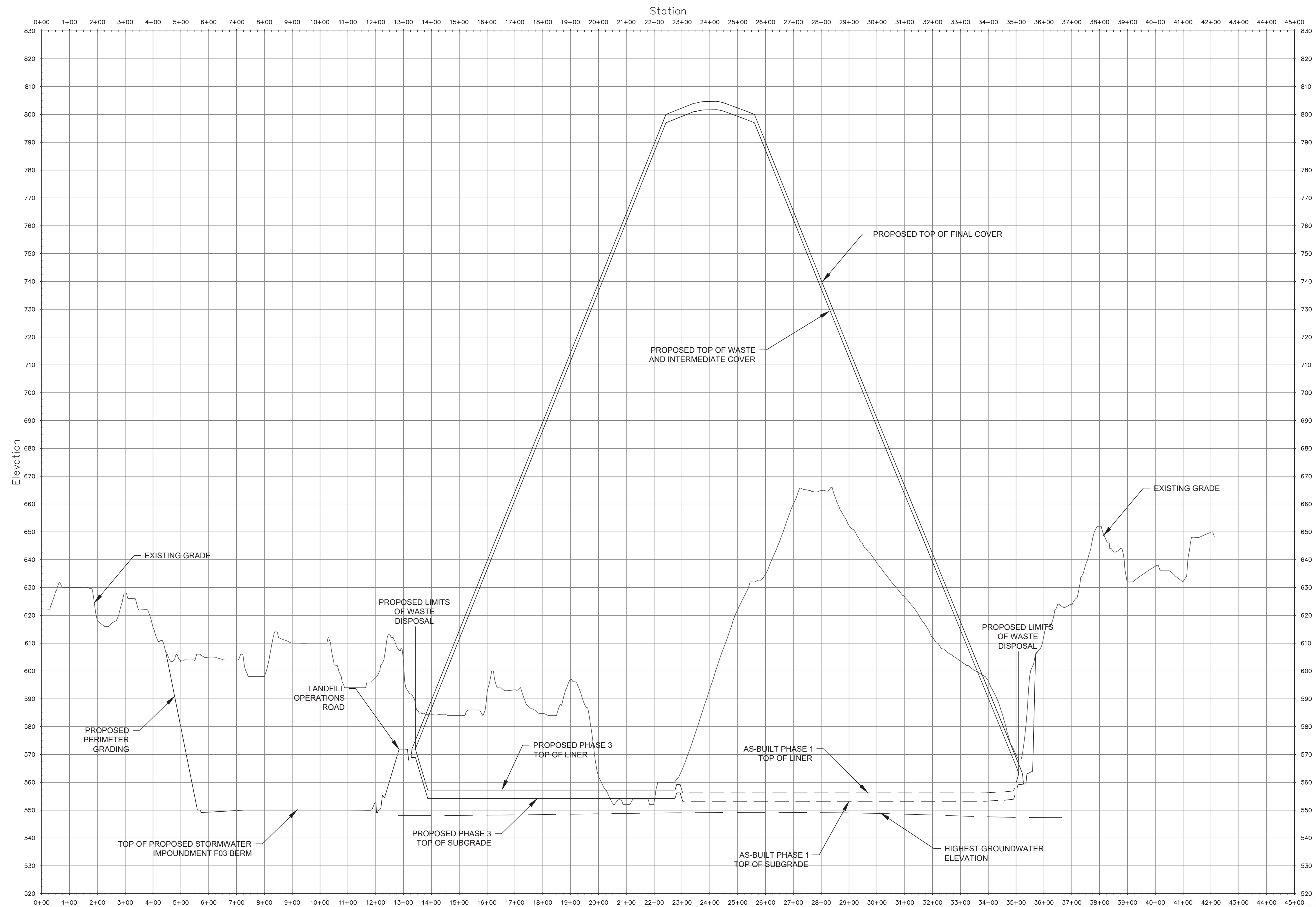
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NO.	DATE	DESCRIPTION	REV BY	CHK BY

**CROSS SECTION C-C'**  
**TIER III PERMIT APPLICATION**  
**FOR LATERAL EXPANSION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**



DESIGNED BY:	DME
DRAWN BY:	DME
CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/18/2018
PROJECT NO:	105-003
SCALE:	AS SHOWN
<b>SHEET 11 OF 17</b>	



CROSS SECTION D-D'

DETAIL D-D'  
SCALE: AS SHOWN

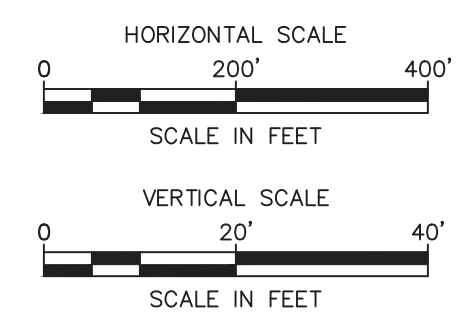
*Turgay M. Ertugrul*  
TURGAY MEHMET ERTUGRUL  
16943  
6/20/2018

NOTES:

- EXISTING GRADES BASED ON AERIAL SURVEY PERFORMED ON FEBRUARY 10, 2017 BY APAC-CENTRAL, INC.
- CROSS SECTIONS LOCATIONS PROVIDED ON SHEET 8.
- LINER DETAILS PROVIDED ON SHEET 14.
- FINAL COVER DETAILS PROVIDED ON SHEET 15.
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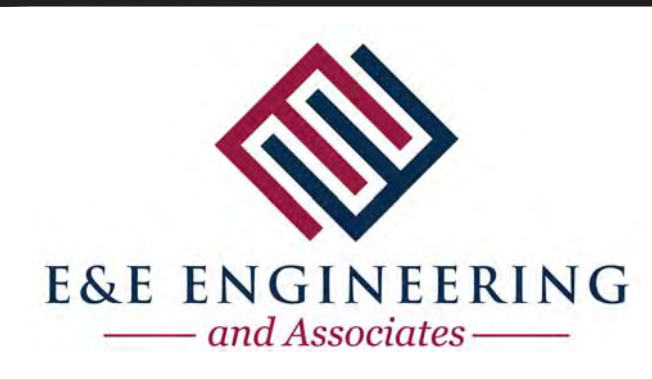
LEGEND

- EXISTING GRADE
- - - EXISTING APPROXIMATE WATER LEVEL
- HIGHEST GROUNDWATER LEVEL
- - - EXISTING AS-BUILT GRADE
- PROPOSED GRADE



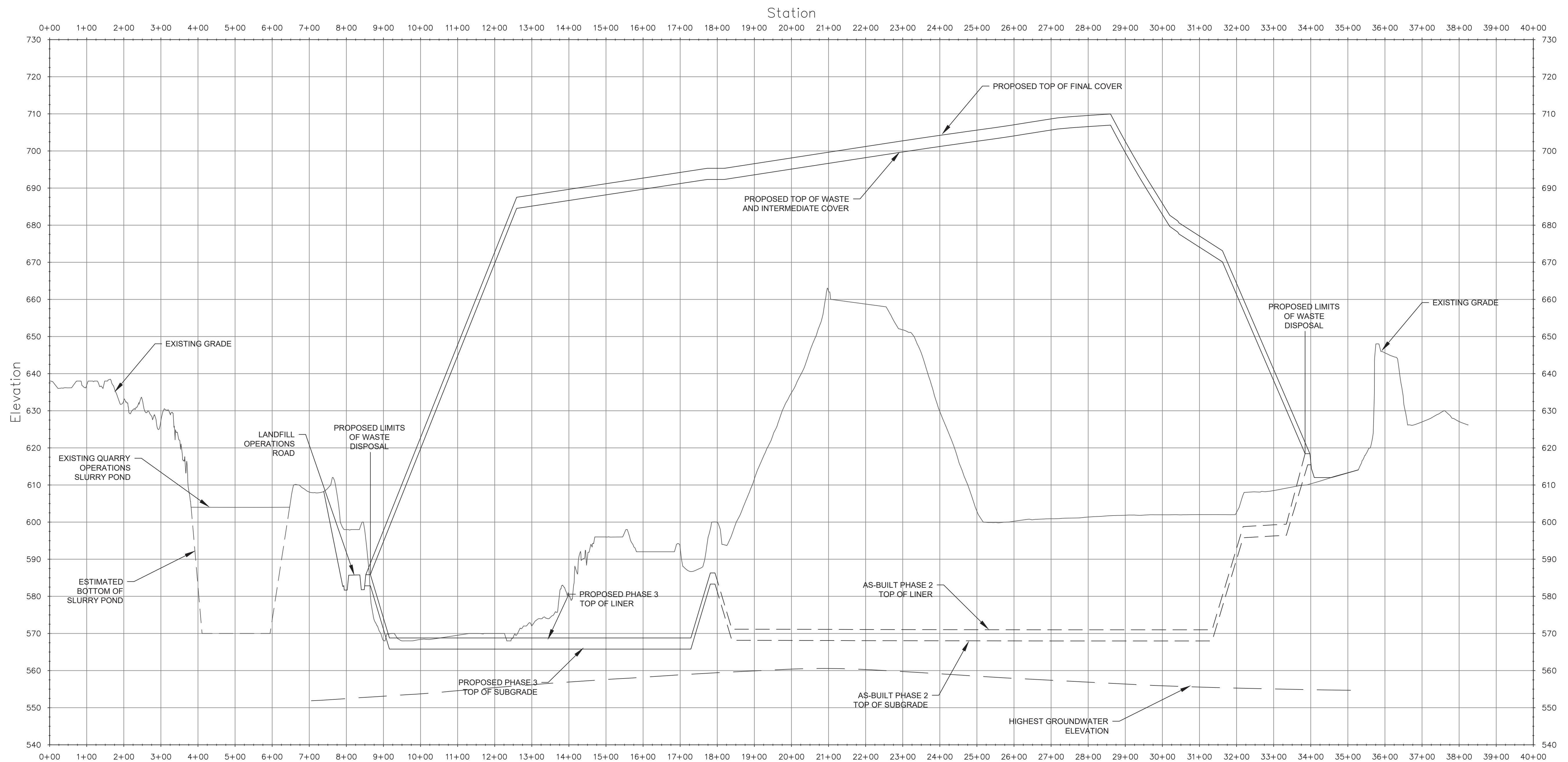
REVISIONS				
NO.	DATE	DESCRIPTION	REV BY	CHK BY

**CROSS SECTION D-D'**  
**TIER III PERMIT APPLICATION**  
**FOR LATERAL EXPANSION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**



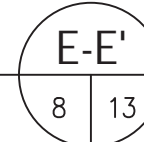
FOR PERMITTING PURPOSES ONLY

DESIGNED BY:	DME
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CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/18/2018
PROJECT NO:	105-003
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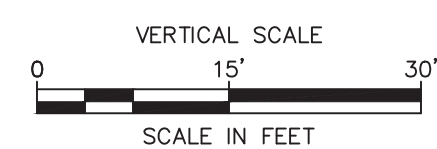
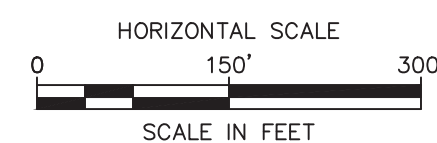
CROSS SECTION E-E'

DETAIL  
SCALE: AS SHOWN



LEGEND

- EXISTING GRADE
- - - EXISTING APPROXIMATE WATER LEVEL
- - - HIGHEST GROUNDWATER LEVEL
- - - EXISTING AS-BUILT GRADE
- PROPOSED GRADE



NOTES:

1. EXISTING GRADES BASED ON AERIAL SURVEY PERFORMED ON FEBRUARY 10, 2017 BY APAC-CENTRAL, INC.
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*Taylor M. Ertugrul*  
 TAYGAY MEHMET ERTUGRUL  
 16849  
 12/12/18

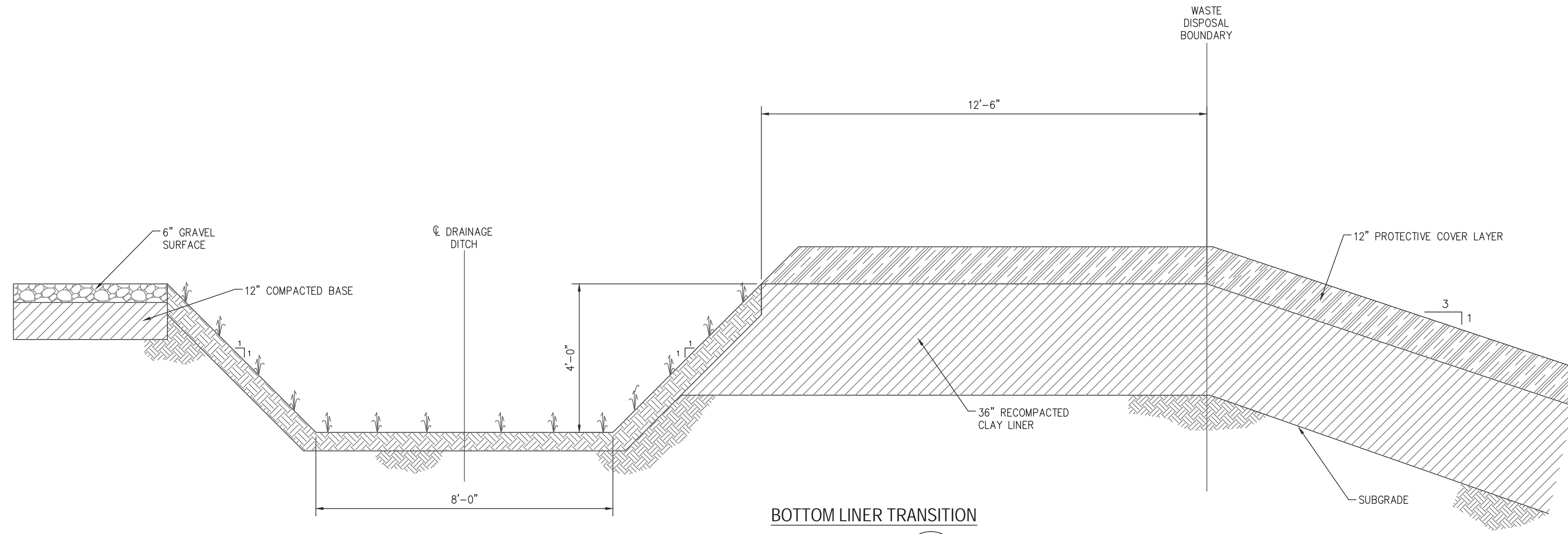
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NO.	DATE	DESCRIPTION	REV BY	CHK BY

**CROSS-SECTION E-E'**  
**TIER III PERMIT APPLICATION**  
**FOR LATERAL EXPANSION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**

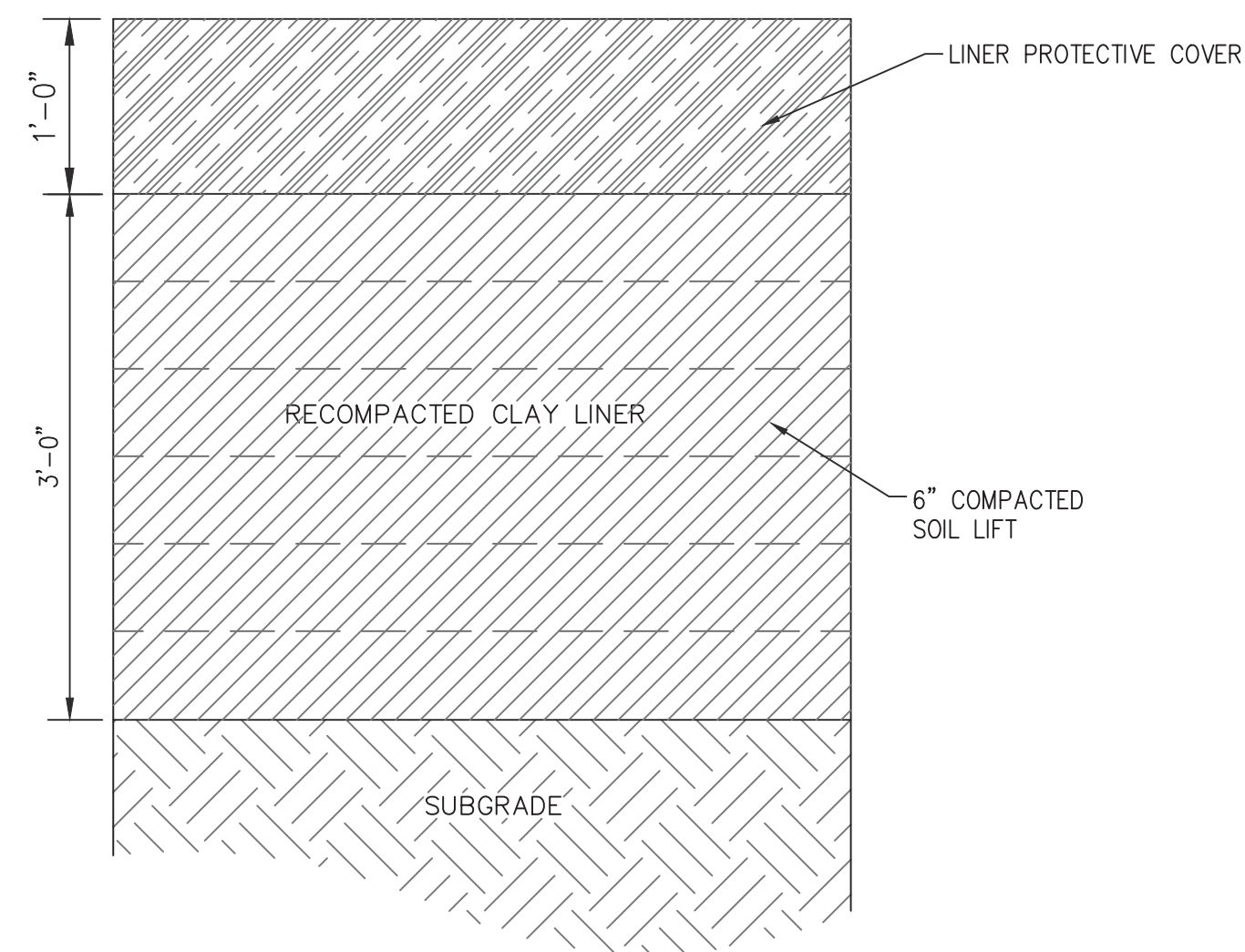


DESIGNED BY:	DME
DRAWN BY:	DME
CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/18/2018
PROJECT NO:	105-003
SCALE:	AS SHOWN
<b>SHEET 13 OF 17</b>	



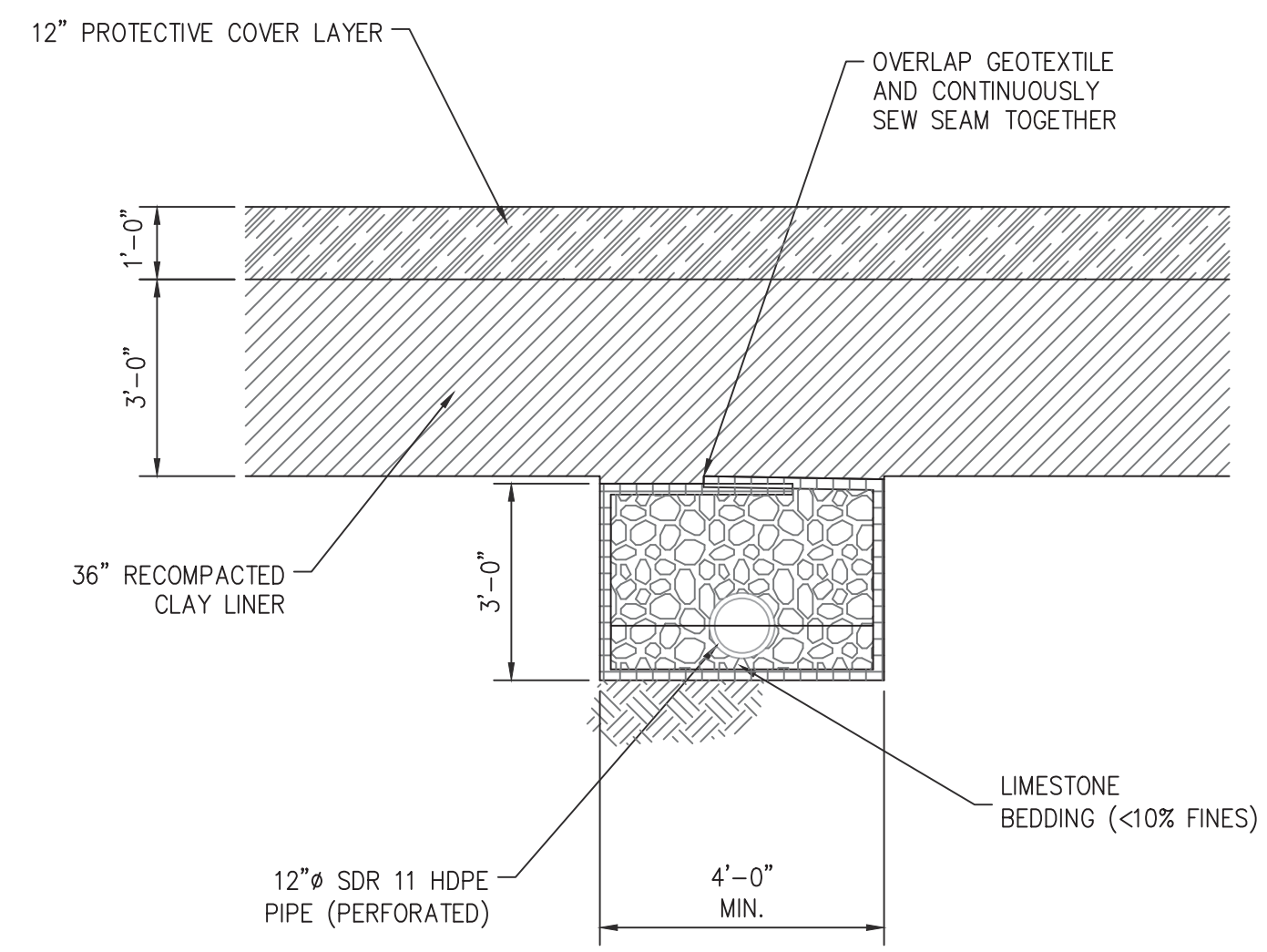
**BOTTOM LINER TRANSITION**

DETAIL 1  
SCALE: 1/2" = 1'-0"  
4 14



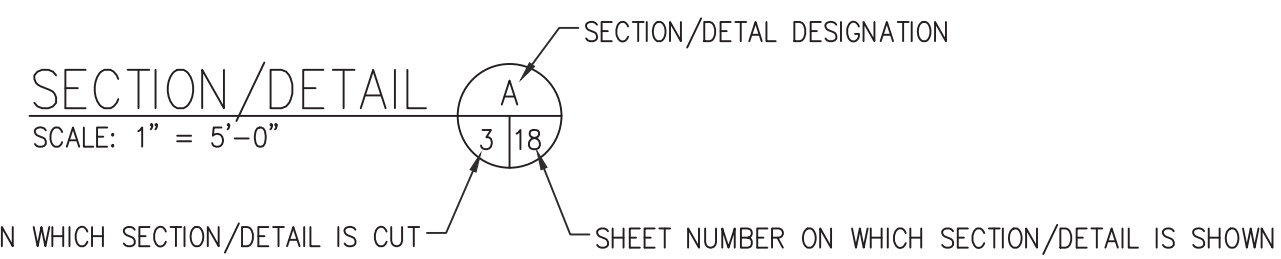
**TYPICAL RECOMPACTED CLAY LINER**

DETAIL 2  
SCALE: 1" = 1'-0"  
5 14



**TYPICAL UNDERDRAIN SYSTEM**

DETAIL 3  
SCALE: 3/8" = 1'-0"  
4 14



SHEET NUMBER ON WHICH SECTION/DETAIL IS CUT

*Turgay M. Kartugul*  
TURGAY MEHMET ERTUGRUL  
10843  
06/18/2018

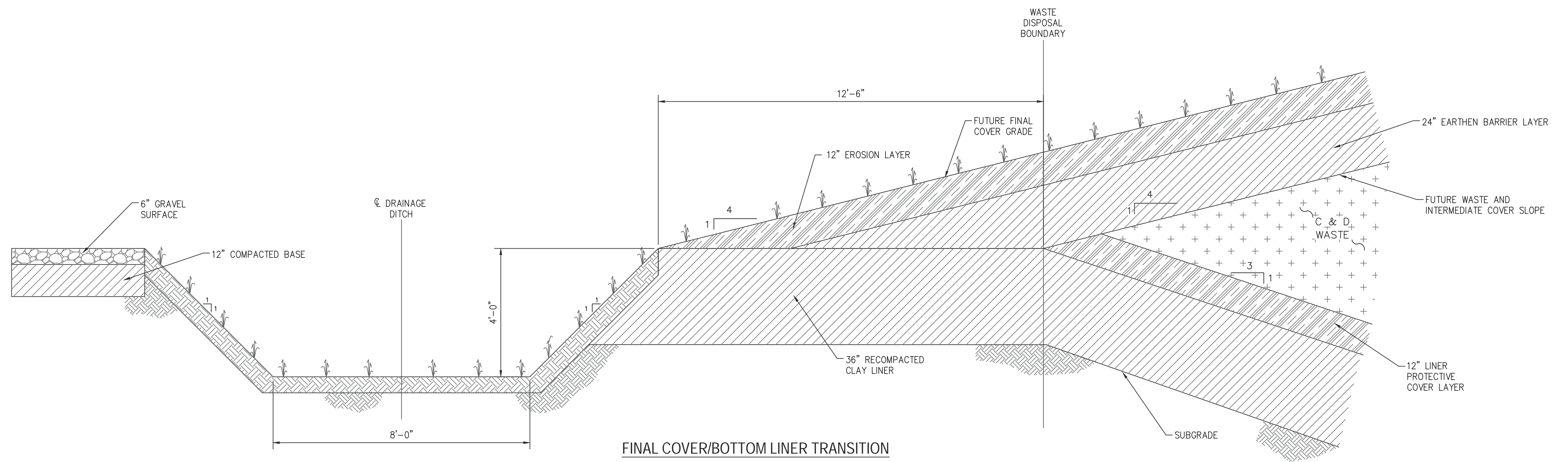
**FOR PERMITTING PURPOSES ONLY**

REVISIONS				
NO.	DATE	DESCRIPTION	REV BY	CHK BY

**LINER SYSTEM DETAILS**  
**TIER III PERMIT APPLICATION**  
**FOR LATERAL EXPANSION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**

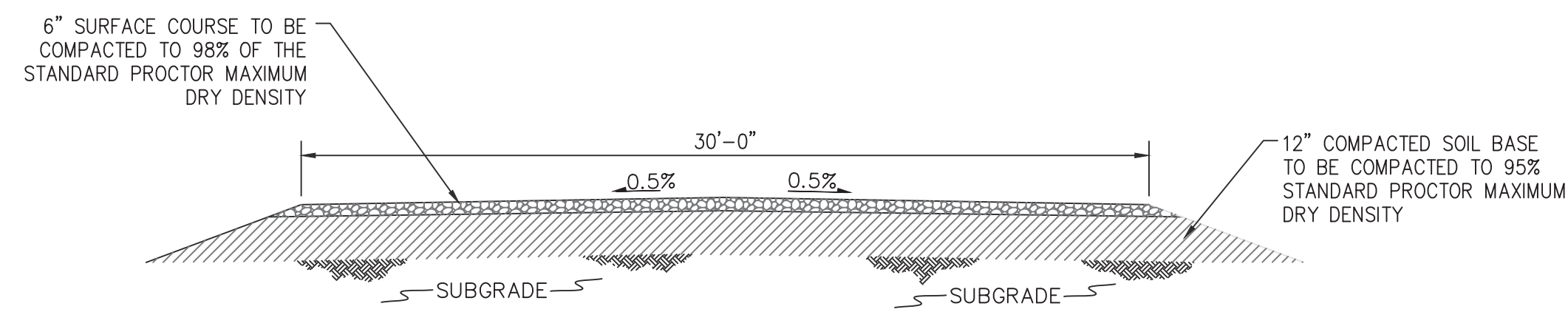


DESIGNED BY:	DME
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PROJECT NO:	105-003
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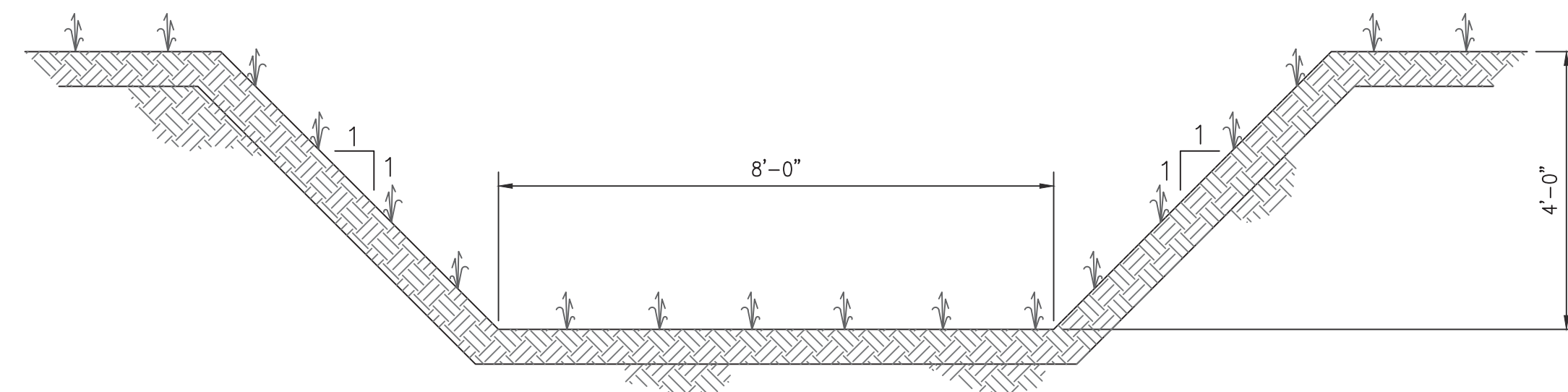
FINAL COVER/BOTTOM LINER TRANSITION

DETAIL 4  
SCALE: 1/2" = 1'-0"  
6 15



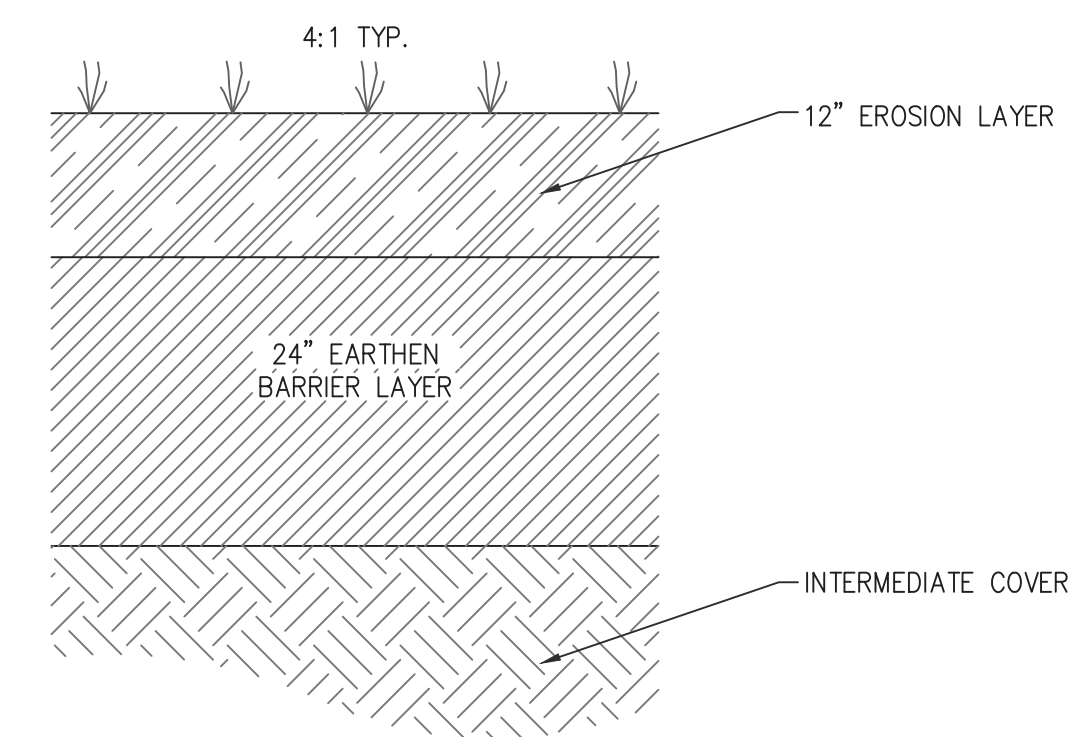
TYPICAL LANDFILL OPERATIONS ROAD

DETAIL 5  
SCALE: 1" = 5'-0"  
4 15



RUN-ON / RUN-OFF CONTROL DITCH (TYPICAL)

DETAIL 6  
SCALE: 1/2" = 1'-0"  
4 15



FINAL COVER DETAIL

DETAIL 7  
SCALE: 3/4" = 1'-0"  
6 15

*Turgay M. Kartogul*  
TURGAY MEHMET ERTUGRUL  
16943  
06/20/18

SECTION/DETAIL A  
SCALE: 1" = 5'-0"  
SECTION/DETAIL DESIGNATION  
3 18  
SHEET NUMBER ON WHICH SECTION/DETAIL IS CUT  
SHEET NUMBER ON WHICH SECTION/DETAIL IS SHOWN

REVISIONS				
NO.	DATE	DESCRIPTION	REV BY	CHK BY

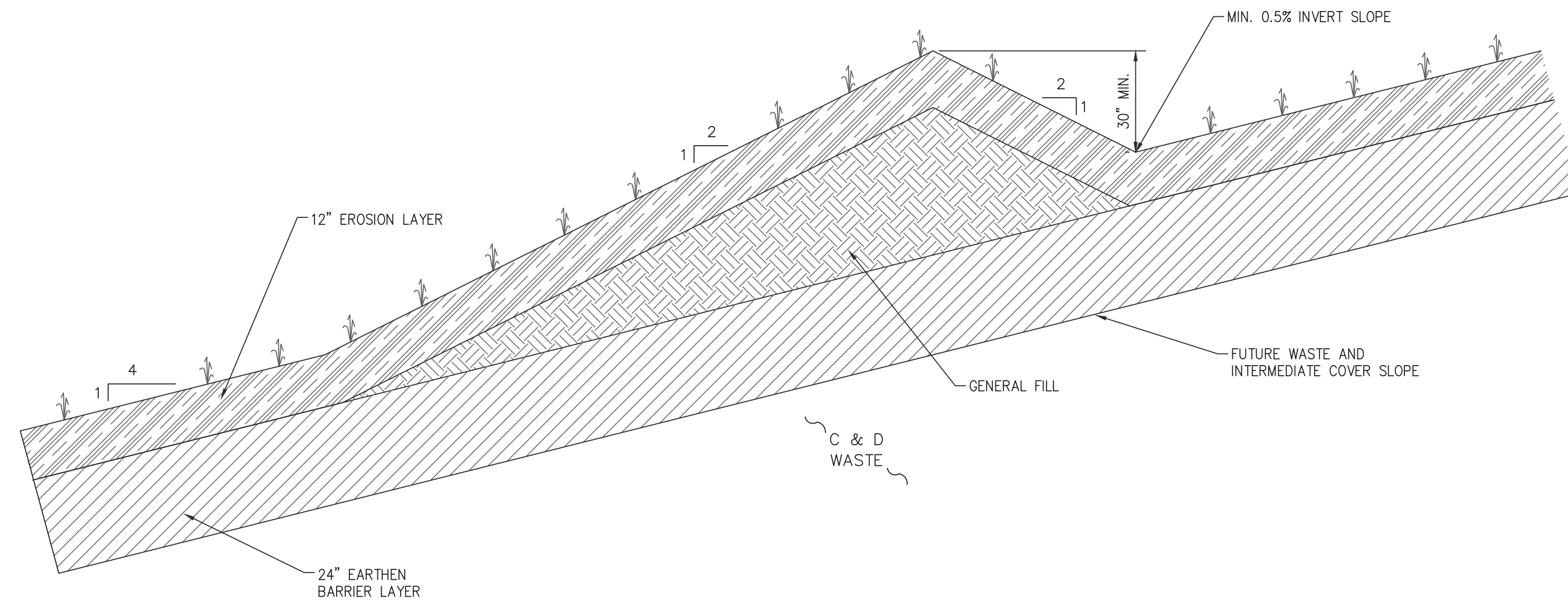
**FINAL COVER DETAILS**  
**TIER III PERMIT APPLICATION**  
**FOR LATERAL EXPANSION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**

**E&E ENGINEERING**  
*and Associates*

**FOR PERMITTING PURPOSES ONLY**

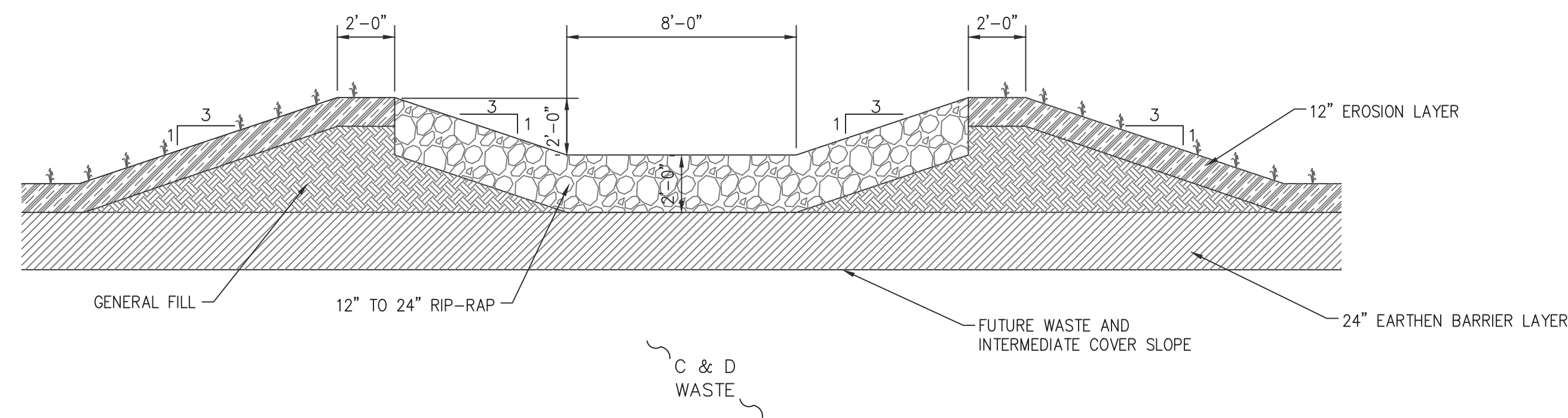
DESIGNED BY:	DME
DRAWN BY:	DME
CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/18/2018
PROJECT NO:	105-003
SCALE:	AS SHOWN

**SHEET 15 OF 17**



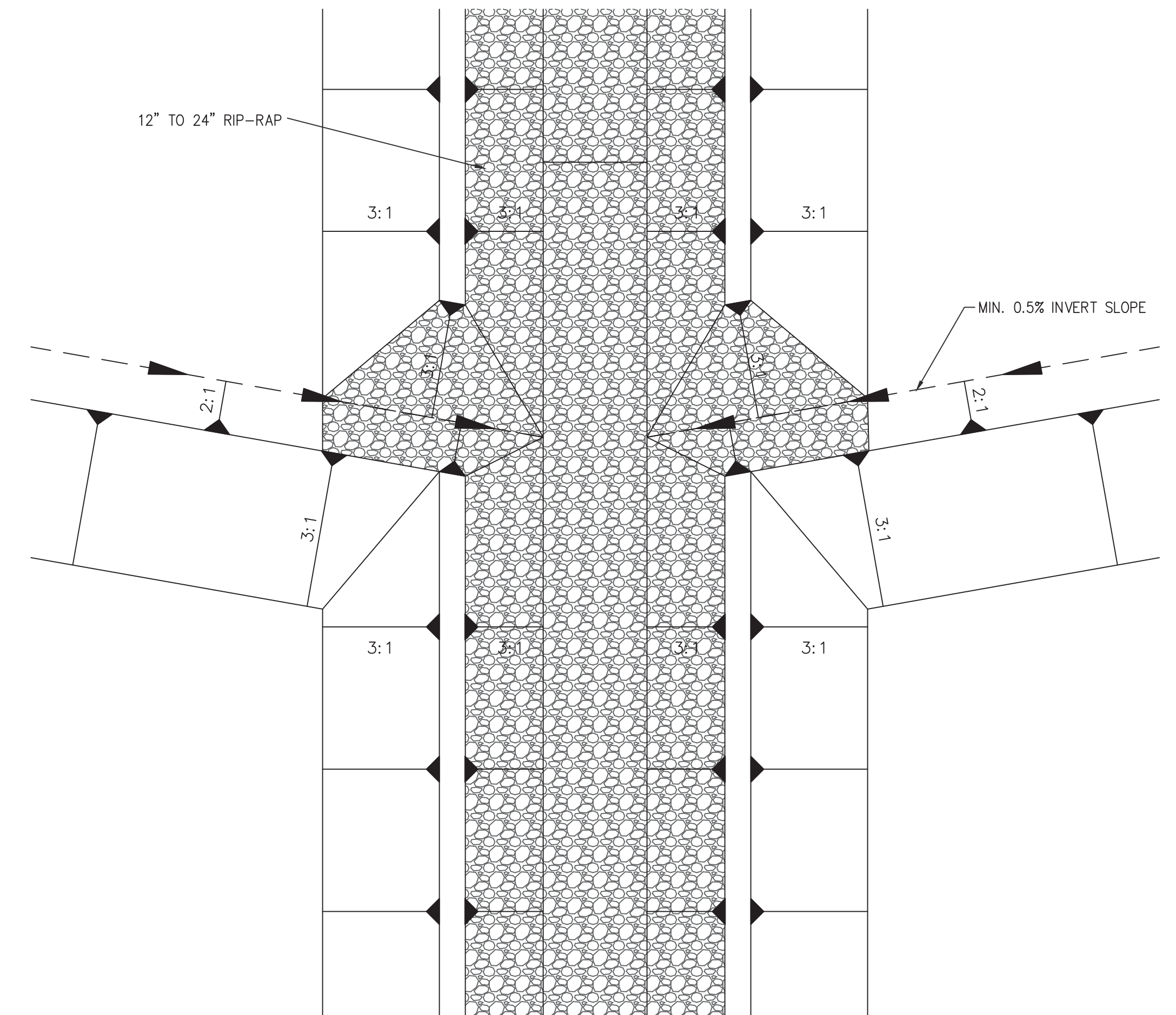
FINAL COVER DRAINAGE SWALE

DETAIL 8  
SCALE: 1/2" = 1'-0"  
7 16



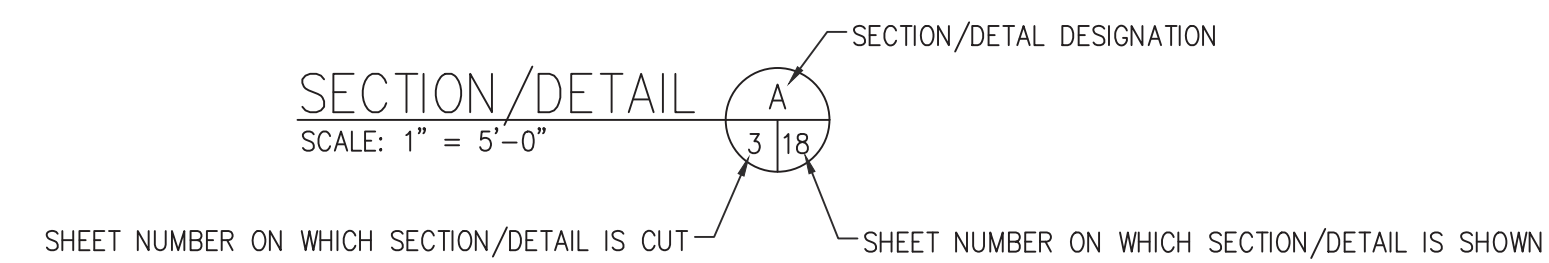
TYPICAL LETDOWN CHANNEL

DETAIL 9  
SCALE: 1/4" = 1'-0"  
7 16



TYPICAL DRAINAGE SWALE AND LETDOWN TIE-IN

DETAIL 10  
SCALE: 1/8" = 1'-0"  
7 16



REVISIONS				
NO.	DATE	DESCRIPTION	REV BY	CHK BY

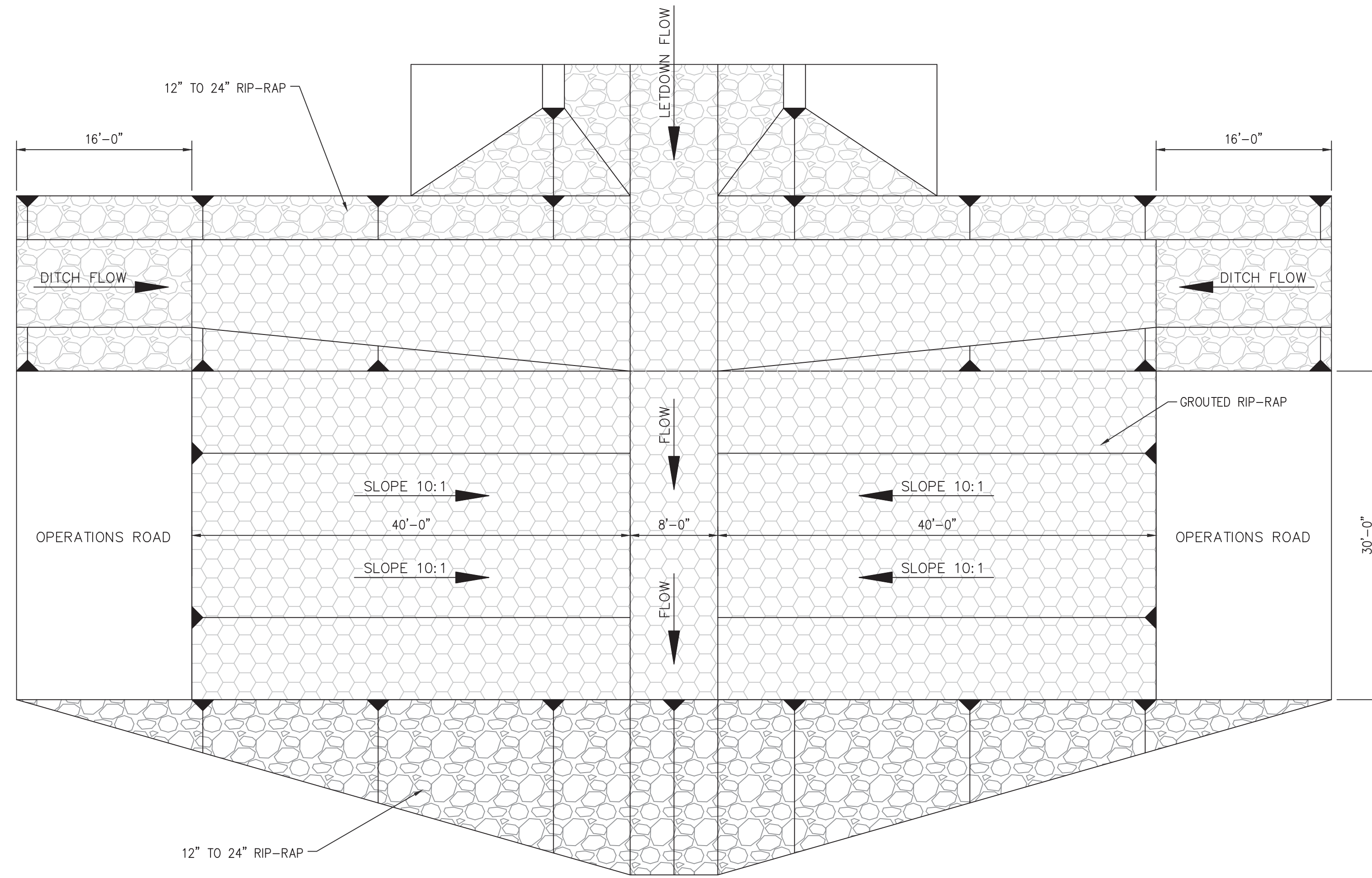
**STORMWATER DETAILS**  
**TIER III PERMIT APPLICATION**  
**FOR LATERAL EXPANSION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**



*Turgay M. Ertugrul*  
 TURGAY MEHMET  
 ERTUGRUL  
 10043  
 06/18/2018

FOR PERMITTING  
 PURPOSES ONLY

DESIGNED BY:	DME
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ISSUE DATE:	06/18/2018
PROJECT NO:	105-003
SCALE:	AS SHOWN



TYPICAL LETDOWN AND LOW WATER CROSSING

DETAIL 11  
SCALE: 1/8" = 1'-0"

SECTION/DETAIL A  
SCALE: 1" = 5'-0"

SECTION/DETAIL DESIGNATION

SHEET NUMBER ON WHICH SECTION/DETAIL IS CUT

SHEET NUMBER ON WHICH SECTION/DETAIL IS SHOWN

*Turgay M. Kartugul*  
 TURGAY MEHMET  
 ERTUGRUL  
 16943  
 6/20/2018

FOR PERMITTING PURPOSES ONLY

REVISIONS				
NO.	DATE	DESCRIPTION	REV BY	CHK BY

**STORMWATER DETAILS**  
**TIER III PERMIT APPLICATION**  
**FOR LATERAL EXPANSION**  
**APAC EAST QUARRY C&D LANDFILL**  
**TULSA COUNTY, OKLAHOMA**



DESIGNED BY:	DME
DRAWN BY:	DME
CHECKED BY:	TME
APPROVED BY:	TME
ISSUE DATE:	06/18/2018
PROJECT NO:	105-003
SCALE:	AS SHOWN



## **APPENDIX A**

### Disclosure Information

**DISCLOSURE STATEMENT FORM**

**INFORMATION AND INSTRUCTIONS:** The Solid Waste Management Act requires applicants to provide the Department of Environmental Quality with information about themselves, any officer, director or partner, any person employed by the applicant as general or key manager who directs the operations of the site which is the subject of the application, and any person owning or controlling more than five percent (5%) of the applicant's debt or equity. By law, the "Disclosure Statement" must be completed by all applicants for the issuance or transfer of any solid waste permit.

If the applicant is a publicly held company, it does not need to submit a disclosure statement, but only need submit the most recent annual (SEC Form 10-K) and quarterly reports (SEC Form 10-Q) required by the Securities and Exchange Commission (SEC), which provide information regarding legal proceedings in which the applicant has been involved. However, the applicant must submit such other information as the Department may require that relates to the competency, reliability, or responsibility of the applicant, officers, directors, or other persons as set out above.

**PLEASE PROVIDE THE FOLLOWING INFORMATION:** (If additional space is required to answer any of the following questions, please make attachments as needed.)

- (1) Name of facility: APAC East Quarry C&D Landfill
  
- (2) Applicant's full name and social security number: APAC-Central, Inc.
  
- (3) Applicant's business address: 4150 S. 100th E. Ave.  
Tulsa, Oklahoma 74146
  
- (4) Applicant's business telephone number: 918-438-2020
  
- (5) Applicant's form of business:  
 publicly-held corporation;  
 privately-held corporation;  
 partnership or sole proprietorship;  
 municipality or public agency;  
 other: wholly-owned subsidiary of a publicly held company
  
- (6) Is Applicant a publicly-held company required to file annual reports with the Securities and Exchange Commission, or a wholly-owned subsidiary of such a company?  
 yes       no
  
- (7) If Applicant answered "yes" to question (6) above, Applicant is required to submit copies of the most recent annual and quarterly reports required by the SEC *that provide information regarding legal proceedings in which Applicant has been involved.* In addition, list below, the name and business address of any person employed by the Applicant as a general or key manager who directs the operations of the site or facility which is the subject of the application.

Mr. Kristopher McClanahan, General Manager  
Mr. William Huckaby, Operations Manager  
Mr. Chris Johnson, Landfill Manager

P.O. Box 580670  
Tulsa, Oklahoma 74158

(NOTE: If Applicant is required to submit SEC reports under this section, no further reporting is required under the disclosure statement requirement, and Applicant should skip to the "Certification and Oath" section on the last page of this form. Applicant should submit copies of any SEC reports as an attachment to this form to be submitted as part of the permit application. If Applicant answered "no" to question (6) above, Applicant is required to complete all remaining sections of this Form.)

(8) Full name, business address and social security number of all affiliated persons:

(NOTE: "Affiliated person" means:

- (a) any officer, director, or partner of the applicant;
- (b) any person employed by the applicant as a general or key manager who directs the operations of the site or facility which is the subject of the application; and
- (c) any person (including corporations, partnerships, etc.) owning or controlling more than five (5) percent of the Applicant's debt or equity.);

(9) Full name and address of any legal entity in which the Applicant holds a debt or equity interest of at least 5 percent, or which is a parent company or subsidiary of the Applicant, and a description of the ongoing organizational relationships as they may impact operations within the State:

(10) Description of the experience and credentials of the Applicant and any "affiliated person", including any past or present permits, licenses, certifications, or operational authorizations relating to environmental facility regulation:

(11) Listing and explanation of any administrative, civil or criminal legal actions against the Applicant or any affiliated person which resulted in a final agency order or final judgment by a court of record

including any final order or judgment on appeal in the ten (10) years immediately preceding the filing of the application relating to solid or hazardous waste. Such action shall include, without limitations, any permit denial or any sanction imposed by a state regulatory authority or the U.S. Environmental Protection Agency:

(12) Listing of any federal environmental agency and any state environmental agency that has or has had regulatory responsibility over Applicant:

### CERTIFICATION AND OATH

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Kais McClanahan  
(Printed or Typed) Name of Applicant or Agent

5-17-18

Date

[Signature]  
Signature of Applicant or Agent

GM- Oklahoma  
Title

### ACKNOWLEDGMENT

State of Oklahoma                    )  
  )  
Tulsa County                         )                    ss.

Before me, the undersigned, in and for said county and state, on this 17 day of May, 2018, personally appeared Kais McClanahan to me known to be the identical person who executed the within and foregoing instrument, and acknowledged to me that executed the same as \_\_\_\_\_ free and voluntary act and deed for the uses and purposes therein set forth.

[Signature]  
Notary Public

My commission expires:

1-25-22



UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION  
WASHINGTON, D.C. 20549  
FORM 20-F

(Mark One)

- REGISTRATION STATEMENT PURSUANT TO SECTION 12(b) OR (g) OF THE SECURITIES EXCHANGE ACT OF 1934  
OR
- X ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934  
For the fiscal year ended: December 31, 2017  
OR
- TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934  
For the transition period from to  
OR
- SHELL COMPANY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934  
Date of event requiring this shell company report

Commission file number: 001-32846

**CRH public limited company**  
(Exact name of Registrant as specified in its charter)

Republic of Ireland  
(Jurisdiction of incorporation or organisation)

Belgard Castle, Clondalkin, Dublin 22, Ireland  
(Address of principal executive offices)

Senan Murphy  
Tel: +353 1 404 1000  
Fax: +353 1 404 1007  
Belgard Castle, Clondalkin, Dublin 22, Ireland  
(Name, Telephone, Email and/or Facsimile number and Address of Company Contact Person)

Securities registered or to be registered pursuant to Section 12(b) of the Act.

<u>Title of Each Class</u>	<u>Name of Each Exchange On Which Registered</u>
<u>CRH plc</u>	
Ordinary Shares/Income Shares of €0.34 each	The New York Stock Exchange*
American Depositary Shares, each representing the right to receive one Ordinary Share	The New York Stock Exchange
<u>CRH America Inc.</u>	
8.125% Notes due 2018 guaranteed by CRH plc	The New York Stock Exchange
5.750% Notes due 2021 guaranteed by CRH plc	The New York Stock Exchange

\* Not for trading but only in connection with the registration of American Depositary Shares, pursuant to the requirements of the Securities and Exchange Commission. Securities registered or to be registered pursuant to Section 12(g) of the Act. None

Securities for which there is a reporting obligation pursuant to Section 15(d) of the Act. None

Indicate the number of outstanding shares of each of the issuer's classes of capital or common stocks as of the close of the period covered by the annual report.

Ordinary Shares/Income Shares of €0.34 each **	838,958,469
5% Cumulative Preference Shares of €1.27 each	50,000
7% 'A' Cumulative Preference Shares of €1.27 each	872,000

\*\* Each Income Share is tied to an Ordinary Share and may only be transferred or otherwise dealt with in conjunction with such Ordinary Share.

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes X No

If this report is an annual or transition report, indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934. Yes  No X  
Note – Checking the box above will not relieve any registrant required to file reports pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 from their obligations under those Sections

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes X No

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes X No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or an emerging growth company. See definition of "large accelerated filer", "accelerated filer", and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer X Accelerated filer  Non-accelerated filer  Emerging Growth Company

If an emerging growth company that prepares its financial statements in accordance with U.S. GAAP, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. Yes  No X

† The term "new or revised financial accounting standard" refers to any update issued by the Financial Accounting Standards Board to its Accounting Standards Codification after April 5, 2012.

Indicate by check mark which basis of accounting the registrant has used to prepare the financial statements included in this filing:

U.S. GAAP  International Financial Reporting Standards as issued by the International Accounting Standards Board X Other

If "Other" has been checked in response to the previous question, indicate by check mark which financial statement item the registrant has elected to follow. Item 17  Item 18

If this is an annual report, indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes  No X



# 2017 Annual Report and Form 20-F





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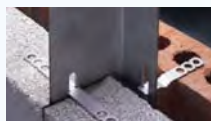
# Our business

CRH manufactures and distributes a diverse range of superior building materials and products for the built environment. From foundations, to frame and roofing, to fitting out the interior space and improving the exterior aesthetic, to on-site works and infrastructural projects including roads and bridges, our materials and products are used extensively in construction projects of all sizes, all across the world.



### Heavyside Materials

- Aggregates
- Cement
- Lime
- Asphalt
- Readymixed Concrete
- Precast Concrete



### Lightside Products

- Architectural Products
- Glass and Glazing Systems
- Construction Accessories
- Shutters and Awnings
- Perimeter Protection
- Network Access Products



### Building Materials Distribution

- General Builders Merchants
- Sanitary, Heating and Plumbing Outlets
- DIY Stores

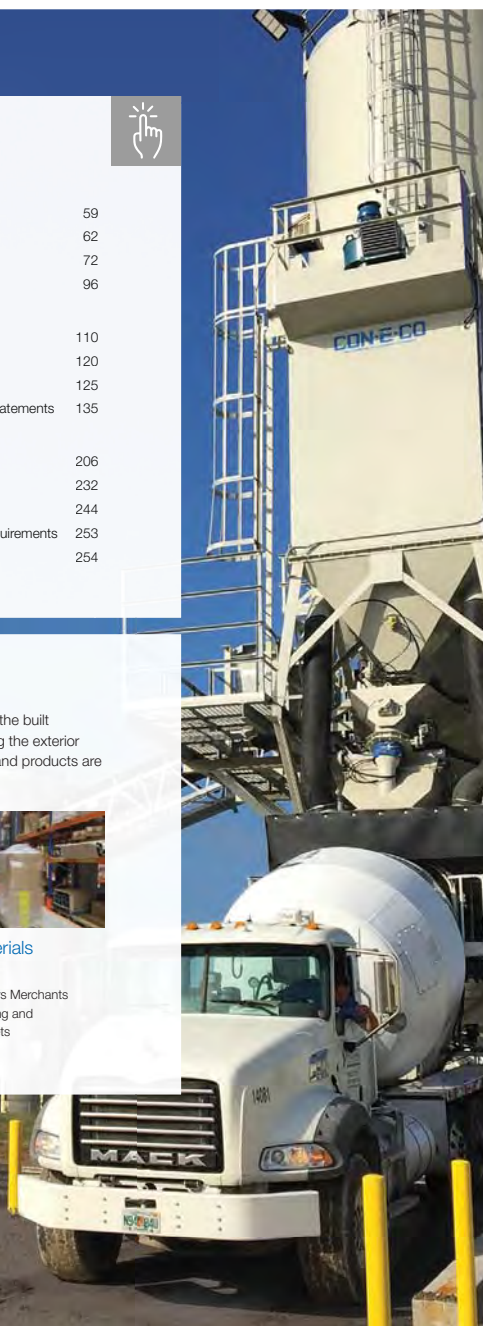
This document constitutes the Annual Report and Financial Statements in accordance with Irish and UK requirements and the Annual Report on Form 20-F in accordance with the US Securities Exchange Act of 1934, for CRH plc for the year ended 31 December 2017. A cross reference to Form 20-F requirements is included on page 253.

The Directors' Statements (comprising the Statement of Directors' Responsibilities, the Viability Statement and the Directors' Compliance Statement on pages 98 to 100), the Independent Auditor's Report (on pages 110 to 117) and the Parent Company financial statements of

CRH plc (on pages 200 to 205) do not form part of CRH's Annual Report on Form 20-F as filed with the Securities and Exchange Commission (SEC).

#### Forward-Looking Statements

This document contains forward-looking statements, which by their nature involve risk and uncertainty. Please see Disclaimer/Forward-Looking Statements on page 97 for more information about these statements and certain factors that may cause them to prove inaccurate.



# CRH at a glance

CRH plc is a leading global diversified building materials group, employing 85,000 people at over 3,600 operating locations in 32 countries worldwide.

CRH is the second largest building materials company worldwide and the largest in North America. The Group has leadership positions in Europe, where it is the largest heavyside materials business, as well as established strategic positions in the emerging economic regions of Asia and South America.

CRH is committed to improving the built environment through the delivery of superior materials and products for

the construction and maintenance of infrastructure, housing and commercial projects.

A Fortune 500 company, CRH is a constituent member of the FTSE 100 index, the EURO STOXX 50 index, the ISEQ 20 and the Dow Jones Sustainability Index (DJSI) Europe. CRH's American Depository Shares (ADSs) are listed on the New York Stock Exchange (NYSE).

CRH's market capitalisation at 31 December 2017 was approximately €25 billion.

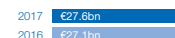
# Our Vision

To be the leading building materials business in the world

# 2017 Performance highlights

### Continuing and Discontinued Operations\*

↑ €27.6 billion  
Sales +2%

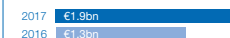


### Continuing Operations

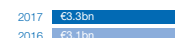
↑ €25.2 billion  
Sales +2%



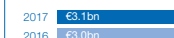
↑ €1.9 billion  
Profit After Tax† +51%



↑ €3.3 billion  
EBITDA (as defined)\* +6%



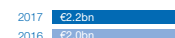
↑ €3.1 billion  
EBITDA (as defined)\* +6%



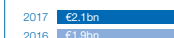
↑ 226.8 cent  
Earnings Per Share\* +51%



↑ €2.2 billion  
Operating Profit +10%



↑ €2.1 billion  
Operating Profit +10%



↑ 68.0 cent  
Dividend Per Share +5%



During 2017 the Americas Distribution segment was classified as discontinued operations under IFRS 5 *Non-Current Assets Held for Sale and Discontinued Operations* (refer to note 2 to the Consolidated Financial Statements for further information). Accordingly, all references to income statement data are on a continuing operations basis throughout the Overview, Strategy Review and Business Performance sections (pages 2 to 53), unless otherwise stated.

\* EBITDA is defined as earnings before interest, taxes, depreciation, amortisation, asset impairment charges, profit on disposals and the Group's share of equity accounted investments' profit after tax.

† Details of how non-GAAP measures are calculated are set out on pages 210 to 213.

‡ Profit after tax and earnings per share are as reported in the Consolidated Income Statement on page 120.



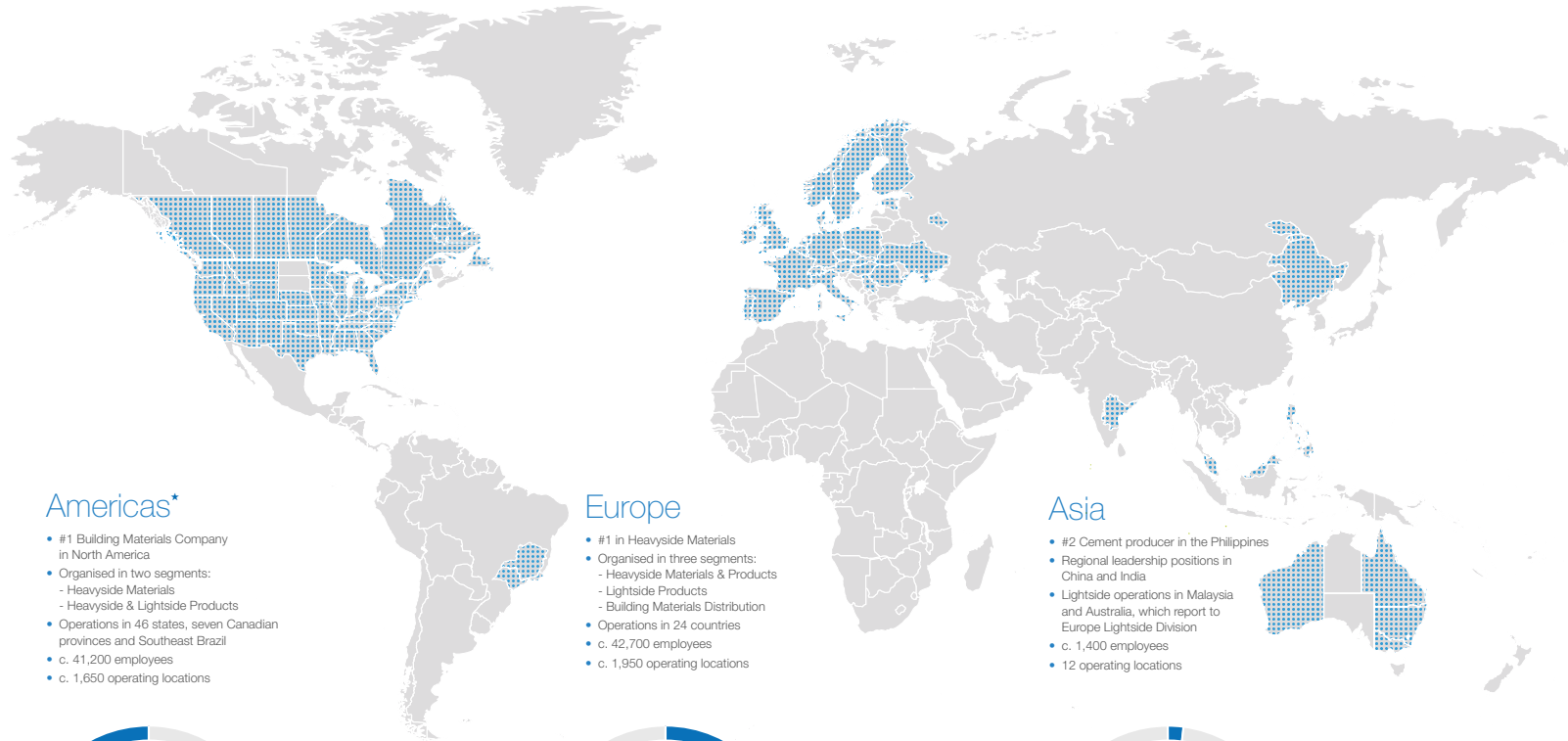
Visit our Investor Relations Centre  
[www.crh.com/investors](http://www.crh.com/investors)

View Annual Report and Form 20-F Online  
[www.crh.com/reports/2017-annual-report-20-f.pdf](http://www.crh.com/reports/2017-annual-report-20-f.pdf)



# Our Global Business in 2017

CRH's global footprint spans 32 countries and over 3,600 operating locations, serving customers across the entire building materials spectrum, on five continents, worldwide.



## Americas\*

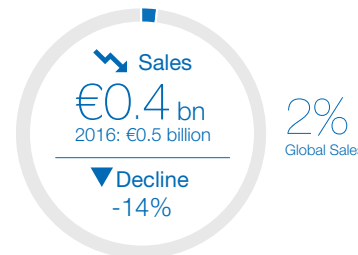
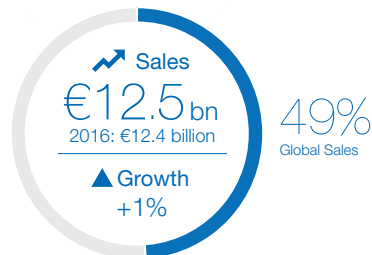
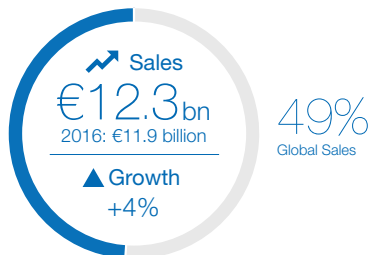
- #1 Building Materials Company in North America
- Organised in two segments:
  - Heavyside Materials
  - Heavyside & Lightside Products
- Operations in 46 states, seven Canadian provinces and Southeast Brazil
- c. 41,200 employees
- c. 1,650 operating locations

## Europe

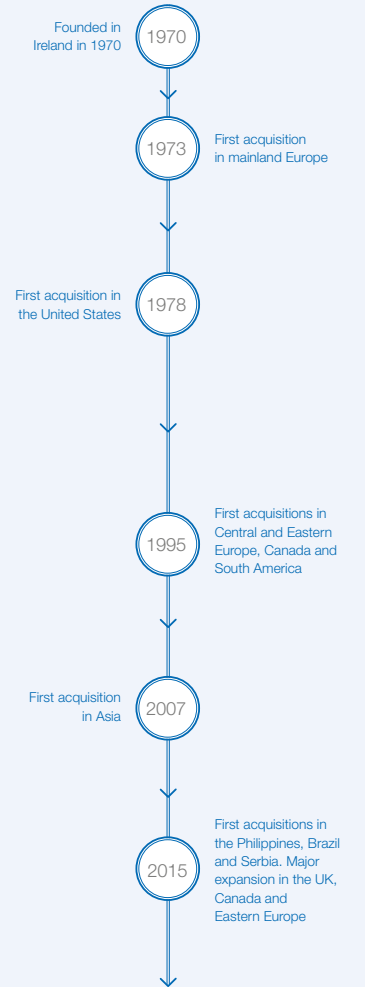
- #1 in Heavyside Materials
- Organised in three segments:
  - Heavyside Materials & Products
  - Lightside Products
  - Building Materials Distribution
- Operations in 24 countries
- c. 42,700 employees
- c. 1,950 operating locations

## Asia

- #2 Cement producer in the Philippines
- Regional leadership positions in China and India
- Lightside operations in Malaysia and Australia, which report to Europe Lightside Division
- c. 1,400 employees
- 12 operating locations



## CRH Timeline

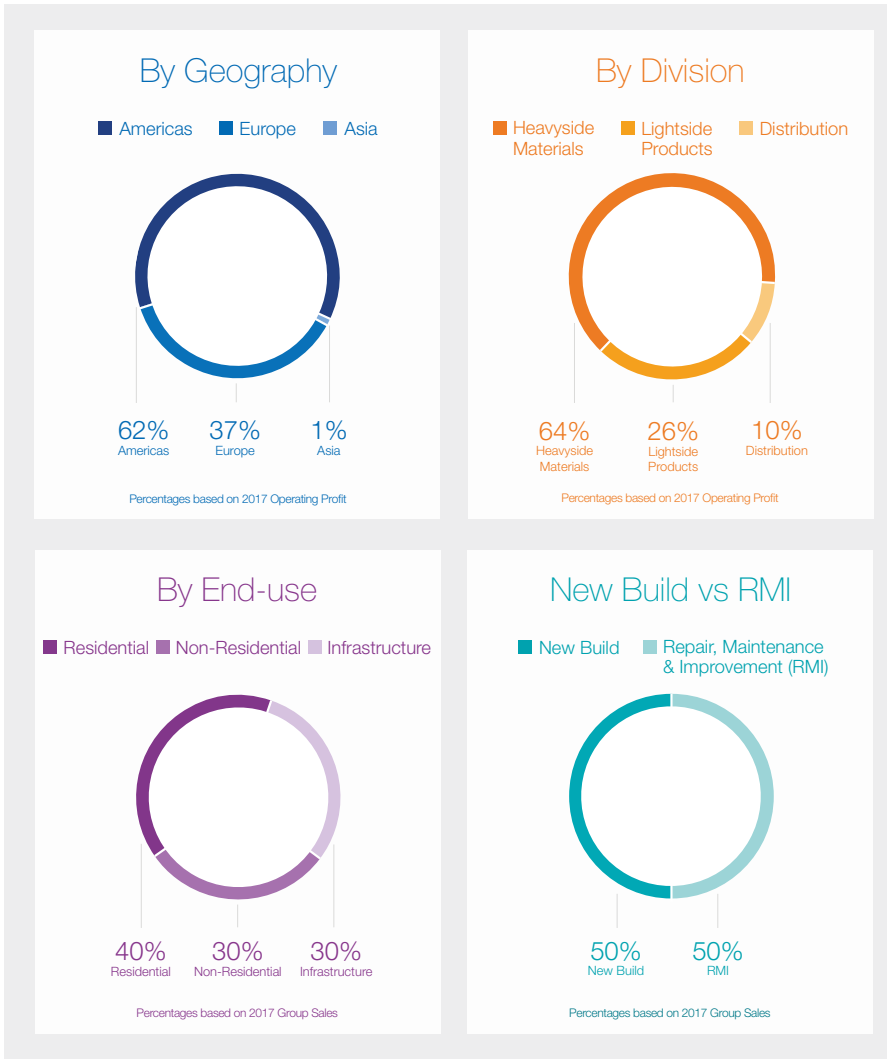






# Our Balanced Portfolio

Building a balanced portfolio is a core constituent of our strategy and a key determinant of value creation for CRH.



# Chairman's Introduction

Dear Shareholder,

I am pleased to report that 2017 was a year of further growth for CRH, with improvements in sales and profits in our Americas and Europe Divisions.

2017 has also been another significant year of development for CRH, with a total of 34 acquisition and investment transactions. In line with the Group's strategy of continually pursuing value creation opportunities through the efficient allocation and reallocation of capital, in August we announced the divestment of our Americas Distribution business (Allied Building Products). The sale, to a highly respected industry player, for US\$2.6 billion, was concluded in January 2018.

Subsequently, in late 2017, we acquired Suwannee American Cement together with certain other materials assets in Florida and announced an agreement to purchase Ash Grove Cement, a leading cement producer in the United States (US), which is due to close during 2018. Combined with the acquisition of Fels, a leading European lime producer, these transactions position the Group to pursue further growth opportunities in key markets.

As you would expect, financial discipline continued to be a key focus for the Board, with year-end net debt/EBITDA (as defined)\* cover remaining strong at 1.8x (2016: 1.7x). Further details on the performance of the Group, its strategy and business model are set out on pages 6 to 53.

Based on the performance in 2017, the Board is recommending a final dividend of 48.8c per share, which, if approved at the 2018 Annual General Meeting (AGM), will result in an increase in the full year dividend of 5% to 68.0c per share.

I look forward to the opportunity to update you further on the Group's performance at the AGM, which will be held on Thursday, 26 April 2018. Notice of the AGM will be posted to shareholders on 28 March 2018 and is available on the CRH website. Details

in relation to the business of the meeting are set out in the Directors' Report on pages 96 to 100.

The Governance section of the Report on pages 59 to 71 provides biographical details for each Director and details of the priorities and focus of the Board. In addition, this section contains important updates in relation to board renewal and diversity, the tendering of CRH's external audit, the implementation of CRH's remuneration policy and shareholder engagement.

In August, Maeve Carton retired from the Board and CRH. Maeve joined CRH in 1988, joined the Board in 2010 and held a number of senior executive roles, including Finance Director and Group Transformation Director. Throughout her exemplary career with the Group, she contributed to the development and progress of CRH, and we wish her well in her retirement.

In December 2017, Ernst Bärtschi resigned from the Board. Ernst joined the Board in October 2011. Over his two terms of three years as a non-executive Director and, in particular, as Chairman of the Audit Committee since September 2013, Ernst committed significant time and effort to CRH. I would like to thank him for his exemplary service and I wish him every success in the future.

I am delighted that Richie Boucher will join the Board with effect from 1 March 2018. I believe that he will be an excellent addition and I look forward to working with him.

I would like to express my appreciation to my non-executive colleagues on the Board for their input and time commitment in 2017.

Finally, on behalf of the Board, I would like to thank the CRH management team, led by Albert Manifold, for the progress and significant achievements made over the past year.

**Nicky Hartery**  
Chairman

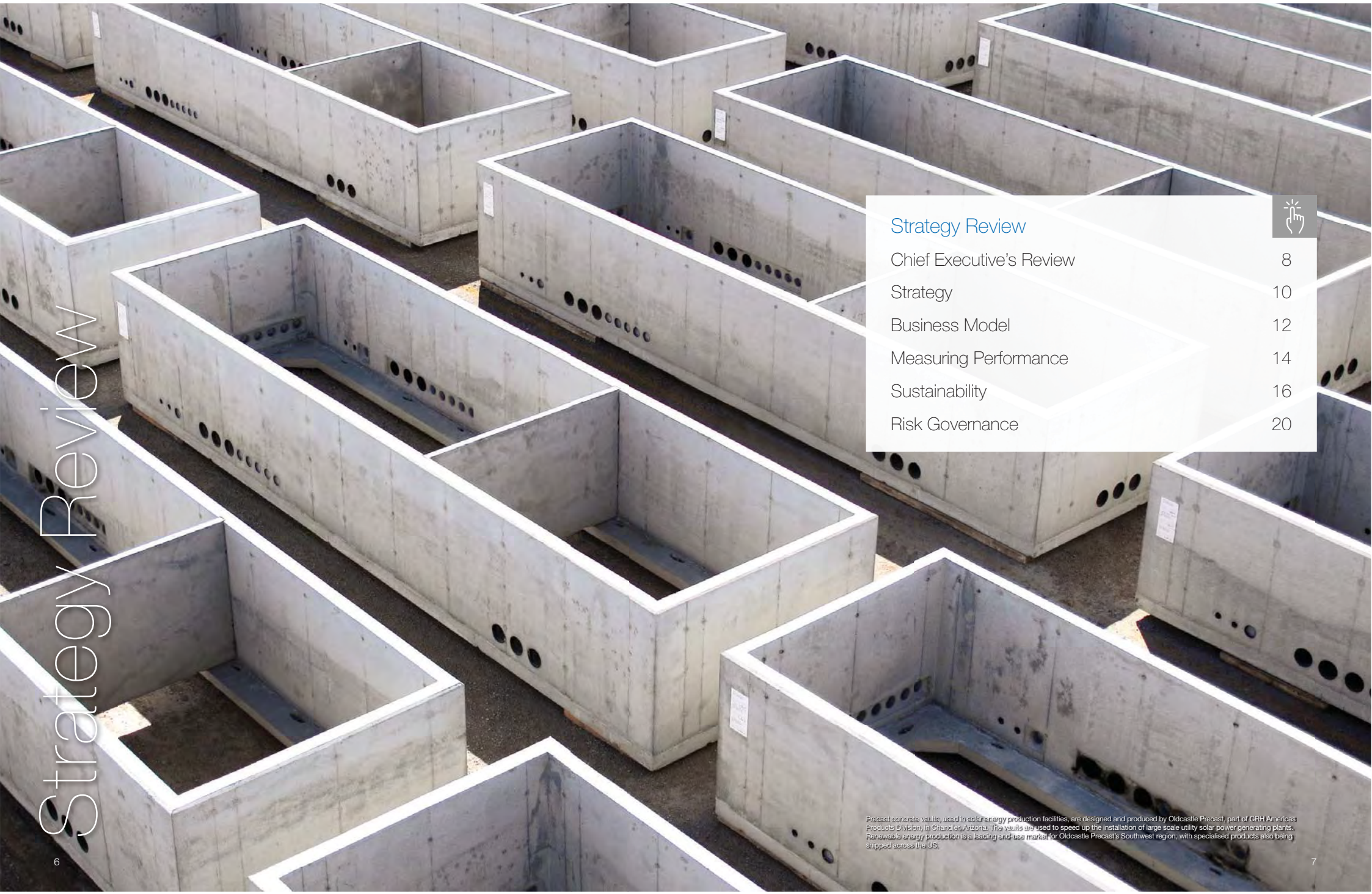
28 February 2018

“ Financial discipline continued to be a key focus for the Board ”

Nicky Hartery, Chairman



\* EBITDA is defined as earnings before interest, taxes, depreciation, amortisation, asset impairment charges, profit on disposals and the Group's share of equity accounted investments' profit after tax.  
♦ Net debt/EBITDA (as defined) from continuing and discontinued operations is a non-GAAP measure as defined on page 212. The GAAP figures that are most directly comparable to the components of net debt/EBITDA (as defined) include: interest-bearing loans and borrowings (2017: €7,976 million; 2016: €7,790 million) and profit after tax (2017: €1,919 million; 2016: €1,270 million). Details of how non-GAAP measures are calculated are set out on pages 210 to 213.



# Strategy Review

## Strategy Review



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Precast concrete vaults, used in solar energy production facilities, are designed and produced by Oldcastle Precast, part of CRH Americas Products Division, in Chandler, Arizona. The vaults are used to speed up the installation of large scale utility solar power generating plants. Renewable energy production is a leading end-use market for Oldcastle Precast's Southwest region, with specialised products also being shipped across the US.



## Chief Executive's Review†

At CRH, one of the key factors in our success, is a proven track record in taking the right step forward at the right time. For almost 50 years, the Group has carefully taken each of the steps that have built CRH into the global leader it is today. With a portfolio balanced across geography, sector and end-use, our businesses serve the needs of customers right across the building materials spectrum. In doing so, we create new opportunities for growth, while preserving existing shareholder value.

In 2017, we continued to focus on identifying, acquiring and integrating businesses that enhance and add value to our existing portfolio. We also pursued opportunities to reallocate capital from low growth to high growth areas. This included our decision to crystallise the value we had built up in our Americas Distribution business, where we saw limited prospects for further growth. Instead, through our acquisition of Suwannee American Cement together with certain other materials assets in Florida, and our agreement to purchase Ash Grove Cement, we are investing in cement and aggregates businesses in the South of the US and west of the Mississippi, where there is a broader base, high population growth, and thus, high demand.

We also maintained our emphasis on continuous improvement across our existing businesses through operational and commercial excellence initiatives. With this dual approach to developing our business, we continued to make progress towards our goal of making CRH the leading building materials business in the world and a leading global industrial company.

### Performance Highlights

The Group delivered a strong performance again in 2017 with revenues increasing 2% to €25.2 billion, driven primarily by the continuing strength of the economy in the US, along with ongoing recovery in our key European markets.

Good profit growth continued, with the Group generating record EBITDA (as defined)\* of €3.3 billion, from continuing and discontinued operations, a 6% increase on the previous year (2016: €3.1 billion), despite significant

currency and weather headwinds. Profit after tax† increased 51% to €1.9 billion (2016: €1.3 billion).

Our continued focus on performance initiatives, along with improvements in pricing in certain key markets, resulted in strong operational leverage, which saw a further increase in margins and returns. Return on Net Assets (RONA)\* for the year improved from 9.7% in 2016 to 10.6%.

Despite significant acquisition activity, net debt/EBITDA (as defined)\* remained strong at 1.8x (2016: 1.7x).

Earnings per share (EPS)† for the year advanced 51% to 226.8c (2016: 150.2c) and the Board has proposed to increase the dividend to 68.0c per share, an increase of 5% compared with last year's level of 65.0c per share.

### Operational Highlights

Overall trading conditions across all Divisions remained broadly positive. In the Americas, where total sales increased 4% to €12.3 billion, a strong US economy with good momentum in the residential and non-residential market segments, underpinned increased revenues.

In our Americas Materials Division, revenues increased 5% to €8.0 billion. Infrastructure activity remained stable in our markets, while our Americas Products Division benefited from stable market fundamentals in southern and western US states.

Despite the impact of significant weather headwinds, the trading environment in the US remained positive overall, with volume growth achieved.

In Europe, where overall sales increased 1% to €12.5 billion, our Heavyside Materials Division benefited from increased demand in certain key markets as the European economy continued to recover at a modest pace. Challenges remained in Switzerland, while in the United Kingdom (UK), despite uncertainty around the impact of Brexit, the performance of our materials business, Tarmac, remained resilient.

Our European Lightside Division, which is favourably exposed to export activity, benefited from growth in key markets. In our European Distribution Division, sales were broadly stable overall and slightly ahead in certain key markets.

In Asia, we continue to take a long-term view in relation to the Philippines, where the challenging pricing environment persisted throughout 2017, despite robust underlying market fundamentals. Our equity accounted investments in China and India both benefited from improvements in pricing during the year.

Overall, a very satisfactory year and while our materials businesses currently account for almost two-thirds of Group operating profit, the strategic importance of our products businesses continues to increase as market demand for building materials evolves and construction methods and technologies change.

### Sustainability and Safety

Sustainability and Corporate Social Responsibility (CSR) are essential components of our business and our ongoing commitment to global sustainable development resulted in the Group's inclusion in the 2017 Dow Jones Sustainability Index (DJSI) Europe. The index represents the gold standard for corporate sustainability and CRH's inclusion comes as a result of a lengthy evaluation based on strict economic, environmental, social and long-term shareholder related criteria.

We also maintained our uncompromising focus on making our work environments safe for our people. This approach has yielded very positive outcomes in recent years. Despite our progress however, in 2017 a number of fatalities at our operations underlined the need for us to do even more to ensure that all of our people return home safe to their families at the end of each working day.

### Development

Having paused major acquisition activity during 2016, to focus our efforts on effectively integrating the businesses acquired during the previous 12 months, CRH again returned

to significant acquisition activity during 2017, completing 34 deals. Total acquisition spend for the period was €1.9 billion, while proceeds from disposals amounted to €222 million.

In Europe, the acquisition of Fels, a leading German lime and aggregates business, is an excellent addition to our portfolio of heavyside businesses and gives us a platform for further growth in the highly attractive European lime market. Lime is a resilient, high-margin business with a customer base extending beyond construction to applications in agriculture and industry. Fels had been an acquisition target for CRH for many years, and our patience and persistence ensured that we acquired it at the right time and at the right multiple.

In the Americas we made a decision to divest our Americas Distribution business, Allied Building Products. The sale of Allied, which closed in January 2018, generated US\$2.6 billion and provided the Group with the opportunity to exit the business at a high multiple and recycle the proceeds into opportunities that offer better long-term prospects for value creation and growth.

We reached an agreement with the Board of Ash Grove Cement to acquire a significant portfolio of cement and other materials assets. This deal is due to close in 2018 and will give CRH a leading market position in the North American cement market for the first time.

Like many of the businesses we have acquired in the US over the years, Ash Grove is a family run business with similar values to CRH. Our Americas Materials business is currently the biggest customer of Ash Grove and CRH's relationship with the company extends back as far as the 1970s.

Ash Grove is the number two cement producer west of the Mississippi. Its eight cement plants, extensive readymixed concrete, aggregates and associated logistics operations are excellent assets, providing important exposure to high-growth urban environments in states such as Texas.

In Florida, another strategically important state due to its strong population growth, CRH became the largest supplier of building materials following our acquisition of Suwannee American Cement together with certain other materials assets.

Our focus now is on integrating these businesses. We will, however, continue to identify value-adding bolt-on acquisitions that we can quickly integrate into our business and that offer good potential for synergies, vertical integration and downstream opportunities.

This value-creating acquisition activity, along with CRH's strong operational performance during 2017, ensures the Group is well positioned for further growth in 2018.

### Outlook

In the US, GDP growth in 2018 is expected to be similar to 2017, supported by steady gains in overall job creation, improving consumer confidence and a slight easing of credit terms. We anticipate continued growth in US housing construction and that non-residential construction will also improve. While the infrastructure market remains broadly stable, there is upside potential due to the growing economy and increased state spending on transportation improvements. With a continuing favourable pricing environment, a sustained emphasis on operating efficiency and benefits from our recent development activity, we expect progress to continue in 2018 in our Americas business.

In Europe, we expect that economic recovery will gather momentum in most countries in 2018. Against a backdrop of increasing demand, particularly in the residential sector, our focus is building upon pricing improvements and efficiency gains achieved in 2017 and as a result, we expect our European business to advance further in 2018.

In Asia, with expectations for continued economic growth in the Philippines, we anticipate some stabilisation of the cement market in 2018, however results from our business will remain challenged.

With a balanced portfolio of businesses, CRH is well positioned to capitalise on ongoing economic growth and our focus remains on consolidating and building upon the gains made in 2017. Against this backdrop, we believe 2018 will be a year of further progress for the Group.

**Albert Manifold**  
Chief Executive

28 February 2018

“ We will continue to identify value-adding bolt-on acquisitions that we can quickly integrate into our business and that offer good potential for synergies, vertical integration and downstream opportunities ”

Albert Manifold, Chief Executive



† See cautionary statement regarding forward-looking statements on page 97.

\* EBITDA is defined as earnings before interest, taxes, depreciation, amortisation, asset impairment charges, profit on disposals and the Group's share of equity accounted investments' profit after tax.

† Profit after tax and earnings per share are as reported in the Consolidated Income Statement on page 120.

‡ RONA from continuing and discontinued operations is a non-GAAP measure as defined on page 211. The GAAP figures that are most directly comparable to the components of RONA include: Group operating profit (2017: €2,095 million; 2016: €1,908 million), total assets and total liabilities respectively (2017: €31,633 million and €16,656 million respectively; 2016: €31,594 million and €17,151 million respectively). Details of how non-GAAP measures are calculated are set out on pages 210 to 213.

# Strategy

## Becoming the global leader in building materials

Our vision is to become the leading building materials business in the world and in doing so, to maximise long-term value and deliver superior returns for all our stakeholders.

At CRH our operations benefit from a relentless focus on continuous improvement, which enables us to build better businesses and generate enhanced returns for shareholders. By maximising the value we extract from our core businesses we ensure the Group is positioned to take advantage of opportunities that arise to strategically develop new platforms for investment and growth.

In pursuing our growth agenda, we maintain a constant focus on financial discipline and strong cash generation. At the heart of this approach is ensuring that above all we protect the customer loyalty and trust we have built up over decades of operation. To do so, we work hard to better understand the unique needs

of customers in the local markets in which we operate. This allows us to deliver in a better way for our customers and provide them with a locally tailored service underpinned by a level of quality and excellence consistent with a global company of our scale.

As we have grown in scale and diversified into new product areas and geographic markets, we have evolved and optimised our approach accordingly. The scale of our operations allows us to pursue economies across a range of operational areas. In addition, a pivotal feature of our approach to development is the identification and integration of bolt-on acquisitions which strengthen existing market positions and provide opportunities for vertical integration.

To continue to successfully execute our strategy in pursuit of our vision of becoming the global leader in building materials, we maintain an ongoing focus on identifying, recruiting, developing and retaining individuals with the potential to become the next generation of leaders for our businesses.

Delivery of the Group's strategy is centred on:

- Optimising performance and returns in our business
- Enhancing our balanced portfolio of diversified products and geographies
- Conducting our business in a responsible and sustainable manner

## Strategy in action

### Continuous Improvement

At CRH continuous improvement is part of our cultural fabric. In 2017 we continued to focus on value realisation through operational and commercial excellence programmes across the Group.

Initiatives like the investment in Liquefied Petroleum Gas (LPG) conversions at our Tarmac asphalt plants in the UK have generated cost savings from reduced energy spend, enhanced burner efficiencies and improved service and maintenance costs. The conversions have also helped to deliver on our commitment to improve our environmental footprint given the lower emissions of LPG compared to liquid fuels.

Initiatives such as these together with an overall investment of over €1.0 billion in capital expenditure during the year, helped deliver a further improvement in RONA to 10.6% ahead of 9.7% in 2016.

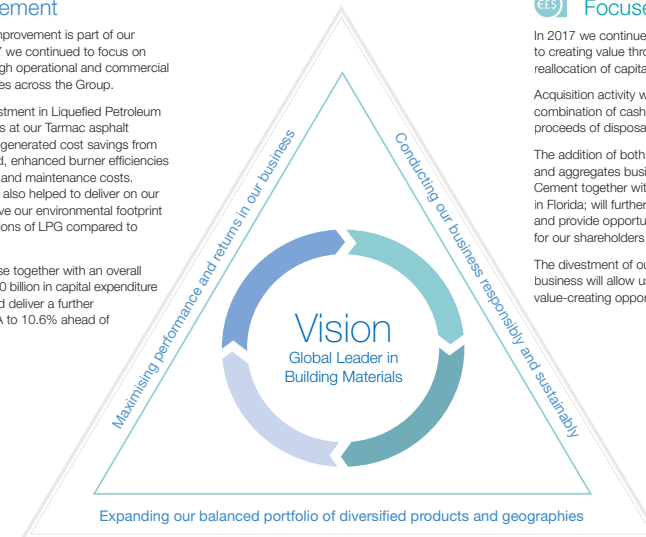
### Disciplined and Focused Growth

In 2017 we continued to take a disciplined approach to creating value through the efficient allocation and reallocation of capital.

Acquisition activity was financed through a combination of cash, existing debt facilities and the proceeds of disposals.

The addition of both Fels; a leading German lime and aggregates business, and Suwannee American Cement together with certain other materials assets in Florida; will further enhance our global portfolio and provide opportunities to create additional value for our shareholders.

The divestment of our Americas Distribution business will allow us to recycle capital into further value-creating opportunities.



### Extracting the Benefits of Scale

The scale of the Group enables the sharing of experience, knowledge and ideas in areas such as operations, finance, Health & Safety and procurement.

In 2017, cost savings were targeted through global procurement initiatives, which increasingly involve CRH centralising certain expenditures at Group level. An example of this is the sourcing of mobile plant and equipment, which involved coordinating the purchase of 212 loading shovels through our global E-Sourcing platform. By providing transparency to suppliers and approaching the market as a single purchasing entity, we were able to deliver 4.3% of savings on the purchases. This approach also succeeded in delivering additional benefits through improved warranties, assurances and efficiencies.

By leveraging the collective knowledge and scale of our businesses we develop our people, encourage collaboration and innovation and professionalise our procurement practices.

### Leadership Development

At CRH we understand that people are the driving force behind our business. Our people are key to developing and maintaining the knowledge and know-how that allows us to be more effective than our competitors. In 2017 we continued to make progress in our efforts to identify, attract and retain senior top talent across the Group.

As part of this, we increased the number of leadership development programmes undertaken. These were attended by a range of high performers from a variety of different parts of our business, ensuring that there is a diverse, capable and expanding leadership pool of talent across all levels within the organisation.

New initiatives introduced through the establishment of a Global Talent Management function also support the early identification of the next generation of leaders. This includes mobility initiatives which enable key talent to develop critical experiences.

These initiatives support our ambition to continue to strengthen the CRH leadership bench with performance driven, entrepreneurial leaders.

## We are guided by a number of strategic imperatives:



### Continuous Improvement

Drive continuous improvement and value realisation through operational, commercial and financial excellence



### Disciplined and Focused Growth

Maintain a constant focus on financial discipline and strong cash generation, which in turn supports our ability to fund new value-creating acquisitions and returns for shareholders



### Extracting the Benefits of our Scale

Leverage Group capabilities and scale to build leadership positions in local markets



### Leadership Development

Attract, develop and empower the next generation of performance-orientated, innovative and entrepreneurial leaders

# Business Model

## How we create value and growth

CRH delivers its strategy through a dynamic business model which is focused on value creation and growth. Since 1970 CRH has delivered an industry-leading compound Total Shareholder Return (TSR) of 15.8%. €100 invested in CRH shares in 1970, with dividends reinvested, would now be worth €97,000.

CRH's business model is centered on making its core businesses better through continuous improvement so that they realise their full potential and create further value.

This is in addition to a continuous focus on the identification of new geographical platforms in our core businesses along with complementary product opportunities which support our efforts to maintain a balanced portfolio and to

establish additional platforms from which to deliver performance and growth.

By balancing our portfolio across geography, product, sector and end-use, we seek to ensure the Group is protected from the impact of low demand at the bottom of any one economic cycle.

The recycling of capital into areas offering better returns and/or superior growth is deeply

embedded into our business model. In this way, we constantly monitor how capital is deployed to create maximum long-term value.

Our focus on maintaining strong financial discipline and cash generation allows us to further invest in our businesses and to take advantage of opportunities for value-adding investments as they arise.

### CRH Business Model

CRH operates businesses across the spectrum of the construction industry in local markets around the world.

Every day we deliver solutions to customers in the residential, non-residential and infrastructure market segments, in 32 countries worldwide.



#### How we Operate

We aim to optimise our return on the resources we need, including:

- Financial capital
- Mineral reserves
- Products
- Our employees
- Business systems
- Intellectual property



#### How we Create Value

- We promote continuous improvement and excellence
- We acquire new businesses with potential to drive growth and returns
- We recycle capital to high-potential areas to maximise returns
- We balance our portfolio of businesses across products, geography and end-use
- We maintain strong financial discipline
- We use EPM to mitigate risks



#### The Value Created

Value we created for stakeholders in 2017 included:

- €3.1 billion EBITDA (as defined)\*
- €1.9 billion Profit After Tax†
- 226.8c EPS‡
- 10.6% RONA▲
- Employment for 85,000 people
- €474 million in taxes paid
- 1.8 million tonnes CO<sub>2</sub> prevented



#### Benefits to CRH

- Strong financial position to support further acquisition activity
- Investment in core businesses to drive continuous improvement and maximise returns
- Reduced cost of capital



#### Benefits to Stakeholders

- Returns to shareholders through dividends and share value appreciation
- Building materials solutions for our customers
- Resilient business partner for suppliers
- Employment and job creation
- A sustainable partner to local communities
- Contribution to government revenues through taxes paid

### Business Model in Action

#### Balanced Portfolio

We aim to maintain a balanced portfolio by ensuring that our businesses are diversified across a range of products, geographies, and end-uses, thereby mitigating the impact of cyclical changes in demand in any one market.

In 2017 the Group's sector exposure, based on sales, was 40% residential, 30% non-residential and 30% infrastructure. End-use, based on sales, was balanced at 50% New Build and 50% RMI.

#### Making Businesses Better

We continue to focus on Making Businesses Better to ensure we deliver growth and create value in a smarter, more thoughtful and consistent manner, and ultimately deliver stronger returns on capital invested.

Our commitment to excellence, continuous improvement, hard work, and value creation lies at the heart of CRH's success.

Our relentless focus on operational and commercial performance in all of our businesses helped deliver RONA of 10.6% in 2017 (2016: 9.7%).

#### Proven Acquisition Model

At CRH our business model focuses on continuously strengthening our core businesses and then identifying and acquiring high-potential businesses that complement and drive value.

In 2017, the addition of the leading German lime producer Fels, provided CRH with a new platform for growth in Europe and attractive value creation opportunities, while the acquisition of Suwannee American Cement together with certain other materials assets in Florida, is expected to generate significant synergies, vertical integration and downstream opportunities.

#### Dynamic Capital Management

As part of our strategic pursuit of focused growth, we take a disciplined approach to capital allocation and reallocation to ensure that capital is recycled at attractive multiples which create value.

In 2017 we reached agreement to divest our Americas Distribution business. Our decision to divest was supported by the absence of value accretive acquisition opportunities and lack of visibility as regards a route to market leadership.

In total, the Group recorded disposal proceeds for 2017 of €222 million and spent €1.9 billion on acquisitions and investment transactions.

#### Financial Strength

Our financial strength allows us to benefit from a lower cost of capital. The Group successfully completed a dual tranche US\$1 billion in May through the issue of a 10-year US\$600 million bond with a coupon of 3.4% and a 30-year US\$400 million bond with a coupon of 4.4%. The Group also successfully amended and extended its principal Revolving Credit Facility in 2017. The facility size, which was increased to €3.5 billion (from €2.5 billion), included a number of new Group banks and the maturity date was extended to 2022 (from 2020). CRH is rated BBB+ by S&P, Baa1 by Moody's and BBB by Fitch.

\* EBITDA is defined as earnings before interest, taxes, depreciation, amortisation, asset impairment charges, profit on disposals and the Group's share of equity accounted investments' profit after tax.  
 ▲ 2016 comparatives for EBITDA (as defined) and RONA were €3.0 billion and 9.7% respectively.  
 † Profit after tax and earnings per share are as reported in the Consolidated Income Statement on page 120.



# Measuring Performance

CRH believes that measurement fosters positive behaviour and performance improvement. As part of the Group's strategic focus on continuous business improvement, CRH uses a number of financial and non-financial Key Performance Indicators (KPIs) to measure progress across our organisation.

## Non-financial KPIs

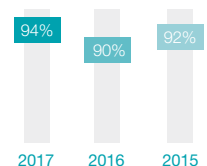
### 2017 Performance

### 2018 Focus

#### % Zero-Accident Locations

A measure of safety performance in our operations. Health & Safety is a priority for CRH and we constantly strive to improve our performance. A strong safety culture is a key element of our business strategy.

Zero-Accident Locations (%)



Continued achievement of a high level of zero-accident locations, with a particular focus on transport and machine safety, contractor safety and behavioural safety in 2017.

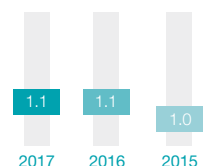
Links to other disclosures: CRH Sustainability Report 2017 will be published in 2018.

Further enhancement of our strong safety culture with the ultimate aim of achieving zero-accident status at every location.

#### Greenhouse Gas Emissions

A measure of addressing the challenges of climate change. Energy efficiency and carbon reduction are twin imperatives of CRH's environmental management strategy.

Scope 1 and 2 CO<sub>2</sub> Emissions (kg/€ Revenue)



Absolute CO<sub>2</sub> emissions increased with increased activity, while CO<sub>2</sub> emissions/€ Revenue was similar to the previous year. For the portfolio of cement plants covered by CRH's CO<sub>2</sub> commitment (Scope 1), there was a continued reduction to 0.59 tonnes net CO<sub>2</sub> per tonne of cementitious product and 2017 emissions were 22% below the baseline year. CRH's CO<sub>2</sub> commitment resulted in the prevention of absolute emissions of 1.6 million tonnes of CO<sub>2</sub> in 2017 alone.

Links to other disclosures: CRH Sustainability Report 2017 will be published in 2018.

Ongoing programmes focus on reducing CO<sub>2</sub> emissions, with a targeted reduction commitment in cement. Lower carbon products and Group-wide energy and resource efficiency programmes.

Note 1: CO<sub>2</sub> emissions subject to final verification under the European Union Emissions Trading Scheme (EU ETS).

Note 2: Group CO<sub>2</sub> emissions data includes both Scope 1 and Scope 2 emissions, as defined by the World Resources Institute Greenhouse Gas Protocol.

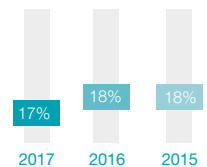
CO<sub>2</sub> Emissions (million tonnes)

	Scope 1	Scope 2
2017	26	2
2016	25	2
2015	20	2

#### Gender Diversity

A measure of an inclusive workplace. Recruitment, selection and promotion decisions are merit-based and in line with the principles of equal opportunity and non-discrimination.

Diversity (% Female)



The building materials industry traditionally attracts a higher than average proportion of male employees. In 2017, 17% of all employees were female, 11% of operational staff were female, while 41% of clerical and administrative staff were female. As at 28 February 2018, 30% of the Directors of CRH plc were female.

Links to other disclosures: Corporate Governance Report pages 62 to 71; CRH Sustainability Report 2017 will be published in 2018.

We continue to champion diversity and inclusion at CRH. The Group is in the process of appointing diversity officers and a number of initiatives focused on improving diversity are planned for 2018.

## Financial KPIs

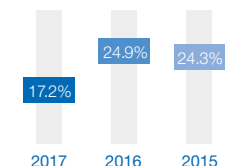
### 2017 Performance

### 2018 Focus

#### Total Shareholder Return (TSR)

A measure of shareholder returns delivery through the cycle. TSR represents the total accumulated value delivered to shareholders (via gross dividends reinvested and share appreciation).

3-Year Annualised Total Shareholder Return (%)



CRH delivered a 3-year annualised TSR of 17.2% in 2017 and in euro terms has delivered a compound annual TSR of 15.8%, since the formation of the Group in 1970.

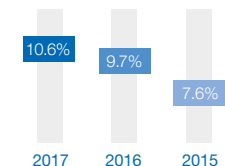
Links to other disclosures: Directors' Remuneration Report pages 72 to 95.

Delivering superior return on invested capital and maintaining strong cash flows to support the continued development of the Group and dividend payment.

#### Return on Net Assets (RONA)

A measure of pre-tax returns through excellence in operational performance.

Return on Net Assets (%)



RONA at 10.6% in 2017 is a reflection of improved profitability.

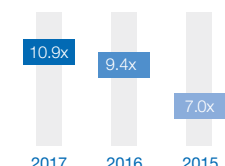
Segmental Reviews pages 30 to 53; Directors' Remuneration Report pages 72 to 95 and Non-GAAP Performance Measures pages 210 to 213.

Improved RONA through effective margin management, continued enhancement of operating efficiencies and tight working capital management.

#### EBITDA (as defined)\* Net Interest Cover\*

A measure of financial liquidity and capital resources which underpins investment grade credit ratings and the ability to access finance.

EBITDA (as defined)\* Net Interest Cover (times)



EBITDA (as defined)\* Net Interest Cover at 10.9x improved in 2017 due to lower interest charges.

Links to other disclosures: Finance Director's Review pages 25 to 29; Non-GAAP Performance Measures pages 210 to 213.

Maintain financial discipline to ensure that Net Interest Cover remains strong and should usually be no lower than 6x.

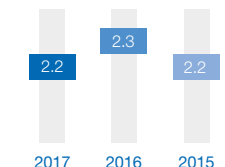
We remain committed to protecting our investment grade credit ratings.

CRH's long-term credit ratings:  
Standard & Poor's: BBB+  
Moody's: Baa1  
Fitch: BBB

#### Operating Cash Flow (OCF)

A measure of cash flows generated to fund organic and acquisitive growth and dividend returns to shareholders.

Operating Cash Flow (€ billion)



Management continues to focus on strong cash generation with OCF at €2.2 billion for 2017.

Links to other disclosures: Finance Director's Review pages 25 to 29.

To continue to generate strong operating cash flows in 2018.

Note 1: Operating cash flow represents net cash inflow from operating activities in the Consolidated Statement of Cash Flows page 124.

\* EBITDA is defined as earnings before interest, taxes, depreciation, amortisation, asset impairment charges, profit on disposals and the Group's share of equity accounted investments' profit after tax.  
● EBITDA (as defined)\* net interest cover is a non-GAAP measure as defined on page 212. The GAAP figures that are most directly comparable to the components of EBITDA (as defined)\* net interest cover include: profit after tax: €1,919 million (2016: €1,270 million), finance costs: €301 million (2016: €325 million) and finance income: €12 million (2016: €8 million). Details of how non-GAAP measures are calculated are set out on pages 210 to 213.

# Sustainability

## Achieving long-term success through sustainability

We believe that a strong sustainability performance is fundamental to achieving our vision of becoming the leading building materials business in the world. As part of our strategy to maximise long-term value and deliver superior returns, we embed sustainability principles in all areas of our business. As we deliver on our strategy, we have a unique opportunity to contribute to some of the key sustainable development challenges facing society.

### Our approach

We take a risk-based, collaborative, strategic approach to responding to global trends in the areas of demographic change, urbanisation, climate change, resource scarcity and technological developments. Risks related to sustainability, including climate-related risks, are fully embedded in our Enterprise Risk Management (ERM) Framework, described on page 20, and details of sustainability risks are given on page 104.

Sustainability principles are embedded in all areas of our business strategy. At Group level, we set policies in key sustainability areas and the delivery of these is the responsibility of management.

We have strong governance structures in place. Policy implementation, effectiveness

and performance against our medium-term objectives as well as long-term ambitions is monitored and reviewed regularly by the Board of Directors. Acquired businesses are rapidly integrated into our processes.

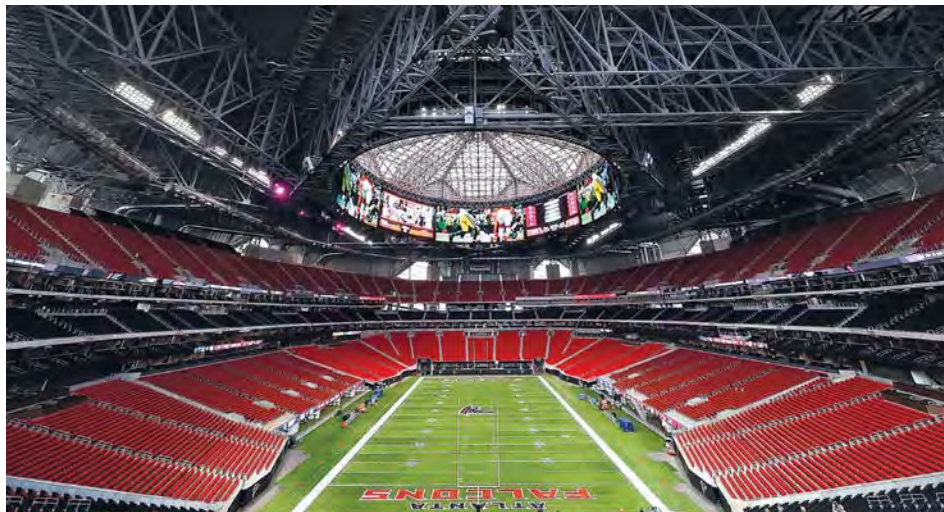
Our annual Sustainability Report, which is prepared in line with the Global Reporting Initiative Standards, is published following external independent assurance and is available at [www.crh.com](http://www.crh.com).

We are committed to reporting on the breadth of our sustainability performance in a comprehensive and transparent manner and to publishing performance indicators, ambitions and outcomes in key sustainability areas.

### Our view

With our extensive global presence and industry leadership positions, we are very aware of our role in the many communities in which we operate. Our materials and products are found throughout the built environment – from critical infrastructure and iconic commercial real estate buildings to family homes in suburban neighbourhoods.

Our business activities provide materials that are needed to fulfil the basic human need of shelter, together with the infrastructure that is needed for our societies to thrive. We believe that meeting these needs in a manner that respects sustainability principles will create long-term value for all our stakeholders including; investors, customers, employees, partners, suppliers, neighbours and local communities.



CRH Americas Products businesses Oldcastle Architectural, Oldcastle BuildingEnvelope® and Oldcastle Precast all provided products to the Mercedes-Benz Stadium in Atlanta, Georgia. The stadium is the first professional stadium in North America to achieve Leadership in Energy and Environmental Design (LEED®) platinum certification.

### Our sustainable value creation model

As we work towards our vision of becoming the leading building materials business in the world, we are careful to ensure that this is not simply about achieving size and scale. It is about building resilient businesses that are the best at what they do, that create sustainable value for all stakeholders and that deliver growth for our shareholders.

Our aim is to create sustainable value by providing industry-leading products and solutions to satisfy the construction needs of our customers around the world. By considering the full life cycle of our products and innovating to drive more sustainable

outcomes in the built environment, we can have a positive impact on wider society and the environment while delivering profitable growth.

As well as being beneficial for our business, these ambitions also have an outward focus. In collaboration with our stakeholders, our actions also contribute to the delivery of key initiatives. These include the World Business Council for Sustainable Development's Low Carbon Technology Partnership Initiative, to which we are a signatory, and the United Nations' (UN) Sustainable Development Goals.

CRH is ranked among sector leaders by leading Environmental, Social and Governance (ESG) rating agencies. We are a constituent

member of indices including the FTSE4Good Index, the STOXX® Global ESG Leaders Indices and the Dow Jones Sustainability Indices. In addition, many operating companies have achieved accolades for excellence in sustainability achievements.

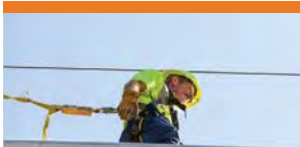
### Our sustainable products in the built environment



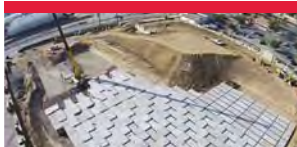
- Balcony connector products that reduce thermal bridging, delivering energy saving
- Concrete Masonry Units with recycled content
- Concrete with low embodied energy and carbon savings supported by life cycle analysis and locally sourced
- Skylights with energy saving from solar heat gain
- Glass with energy saving from solar heat gain
- Precast concrete flooring and walling elements delivering energy savings
- High performance glass and glazing products that incorporate innovative thermal break technologies for superior thermal performance and solar heat gain control while providing essential daylight and ventilation for the building
- Vaulted ceilings with improved thermal comfort, daylight and ventilation, containing recycled content and lower embodied energy
- Lower carbon warm-mix asphalt with high recycled content and sustainable run-off design
- Permeable paving connected to sustainable urban drainage systems
- Shutters and awning products, reducing solar heat gain

# Sustainability - continued

## Progressing our key priority areas



Safe working practices and personal fall protection reduce safety risks from working at heights for Gulf Coast workers at this Port of Beaumont project in Texas, US.



The Oldcastle Precast StormCapture system, installed at a community development in California, US, captures and treats stormwater, reducing flooding and water quality risks.



The Kaltes Tal lime production plant, Germany, part of the Fels acquisition in 2017, is being integrated into the CRH Group.



An employee at Tarmac, UK, which has an active programme to increase the proportion of women in its organisation.



Northstone works with external stakeholders to protect wildlife, including this peacock butterfly (*Aglais io*), photographed at Croagh Quarry, Northern Ireland.



Colleagues from across CRH came together at our annual Regulatory, Compliance and Ethics Conference with a focus on 'OneCRH Stronger Together'.



### Embedding a culture of safety

Safety has long been a strategic priority for CRH. There are multiple safety risks and hazards associated with our industry, therefore, our focus on safety is unrelenting. Our global network of safety officers works closely with our businesses in implementing policy and best practice across all of our operations.

In 2017, 94% of active locations were accident free. The accident frequency rate (number of accidents per million manhours) continued to decline and has reduced by an average of 12% per annum over the last decade. We are however deeply saddened to report that there were three employee fatalities and seven contractor fatalities at our operations during 2017. Of these fatalities, three were road traffic accidents. We deeply regret this loss of life and extend our sincere sympathies to the families of each individual. All fatalities are independently investigated and we continue to implement our Fatality Elimination Plan, which remains a cornerstone of our safety strategy and which proved effective in eliminating employee fatalities in both 2014 and 2015.

We also continue to invest in initiatives targeted at promoting and maintaining a strong culture of safety and in the past five years over €160 million has been invested in this area.



### Creating solutions for our customers

Every day, in 32 countries worldwide, our employees deliver solutions for customers in the residential, non-residential and infrastructure market segments. We work with our customers to create products that deliver specific sustainability and performance goals, solve problems through innovative design, products and processes, and create added value for their businesses.

We maintain a strong focus on the development of climate-friendly building materials such as lower carbon cements, warm-mix asphalt and recycled aggregates. Not only does this help to reduce CO<sub>2</sub> emissions, it also minimises construction waste. Approximately 75% of our US asphalt volume in 2017 was lower carbon warm-mix asphalt, as defined by the National Asphalt Pavement Association, and recycled asphalt pavement and shingles provided a fifth of raw materials requirements in this business. In addition, products such as concrete and building envelope products can also contribute to a more energy-efficient, resilient and sustainable built environment.



### Collaborating and engaging for sustainability

Business is about people, and at CRH we believe success is built on developing transparent and trusting relationships with all stakeholders. We take an inclusive, collaborative and responsive approach to developing stakeholder relationships, taking care to maintain transparency throughout.

Our businesses are rooted in local communities and it is our aim to create real and lasting value for our stakeholders. Whether serving our customers, participating in community initiatives or partnering with each other, we know that in today's increasingly complex world, we can achieve much more when we collaborate with others.

In 2017 our Group companies hosted 1,100 stakeholder events in keeping with our policy to engage in an open, honest and proactive way. The outcomes from these stakeholder engagement processes inform our continuous improvement activities.



### Developing and empowering our people

With operations in 32 countries, CRH is not only multinational but also multicultural. Our aim is to attract and develop a workforce that is as diverse as our customers and our communities, recognising that people are critical to sustaining competitive advantage and long-term success. We believe that employing people from a broad range of ethnicities, backgrounds, experiences and perspectives creates an inclusive workforce, which provides us with competitive advantage.

The building materials industry traditionally attracts more male than female employees. In 2017, 17% of employees overall were female, while of operational staff, 11% were female and of clerical and administrative staff, 41% were female. Within senior management, 9% were female. As at 28 February 2018, 30% of the Directors of CRH plc were female.

In 2017, we continued with our focused diversity programmes, which are aimed at increasing social diversity, not only of employees, but also of the pool of talent available to take up opportunities in CRH. Going beyond this, we endeavour to ensure equal access to rewarding career and personal development experiences for employees worldwide.

In 2017, we continued to place an emphasis on training and skills learning, as well as developing and recruiting talented leaders to guide our evolving and growing Group.



### Protecting the environment

While potential impacts and risks vary across our businesses, excellence in environmental management, together with a proactive approach to addressing the challenges and opportunities of climate change, is fundamental to our continuous improvement approach.

We work with stakeholders including customers and the wider building materials industry in promoting energy and resource efficiency, emissions reductions and biodiversity enhancements. For example, by incorporating alternative raw materials into our products we reduced our reliance on virgin raw materials by 30 million tonnes in 2017.

Climate change is a key societal challenge and we have governance structures that provide oversight, assessment and management of climate-related risks and opportunities. Our climate strategy, which is integrated with our business strategy, focuses on providing building solutions that reduce emissions and promote climate resilience, recognising the long-term durability, resilience and carbon benefits of concrete construction during the lifetime of buildings. We also focus on reducing our own emissions and hence the carbon footprint of our products.

We are on-track to achieve our commitment to reduce specific net CO<sub>2</sub> emissions by 25% over 1990 levels by 2020; 2017 emissions were 22% below 1990 levels. Key performance indicators in this area are included on page 14.



### Building a resilient and sustainable business

We view integrity and good governance as fundamental to long-term business success and we are committed to meeting the highest standards of business conduct and corporate governance.

We implement our comprehensive Code of Business Conduct (CoBC), which is underpinned by our policies including Anti-Fraud & Anti-Theft, Anti-Bribery and our Competition Code. In addition, we have implemented an Ethical Procurement Code and Supplier Code of Conduct, with the aim of extending our positive influence along the value chain.

We endorse human and labour rights and support the principles set out in the articles of the UN's Universal Declaration of Human Rights and the International Labour Organisation's Core Labour Principles. We continue to improve our processes and policies in line with evolving best practices and ensure our coverage incorporates all stakeholder groups, paying special attention to vulnerable groups such as children, women, minorities and migrant groups.

We foster an open culture of ethical behaviour driven from the top of the business, communicating to employees what is expected of them and equipping them with the tools they need to ensure compliance. We embrace a 'speak-up' culture where employees are encouraged to inform us immediately of any actual or suspected unethical behaviour or a possible breach of conduct.



# Risk Governance

## Creating value through risk management

The goal of Enterprise Risk Management is to deliver increased shareholder value for CRH. Effective governance, which is considered fundamental in CRH, is critical to success, supporting management in executing strategy, managing costs, responding to risks, capturing opportunities, achieving regulatory compliance and in promoting effective decision making.

Effectively managing risk is of vital importance in CRH and the Group's Enterprise Risk Management (ERM) Framework is the basis for identifying, assessing and managing risks associated with business and strategic corporate decisions. ERM in CRH is a forward-looking, strategy-centric approach to managing the risks inherent in decision making. It recognises the linkage between business objectives and strategies and their associated risks and opportunities, and integrates

strategic decision making and risk taking in order to preserve and/or enhance value and reputation.

With our balanced portfolio, the decentralised and geographically dispersed structure of the Group provides some natural mitigation for some of the significant risks and uncertainties faced, such as industry cyclicality, political and economic uncertainty and damage to corporate reputation.

### ERM Framework

The ERM Framework (the 'Framework') addresses risks across the various strands of CRH's strategy, driving performance, executing organic and acquisitive growth, protecting information assets, monitoring compliance with all laws and regulations (including an unwavering commitment to Health & Safety), sustainability, leadership development and talent management and finance.

In formalising CRH's approach to risk management through ERM, a key requirement has been to ensure that the Framework continues to deliver value for management by providing visibility on strategic priorities and the linkages to the associated risks and opportunities. The key risks identified are reported periodically to the Audit Committee and the Board, with the risks being subject to common, standardised and repeatable processes of assessment, evaluation, management and monitoring.

In line with international best practice, CRH follows a "three lines of defence" model for risk management and internal control which is highlighted on page 20.

### Roles and Responsibilities

The Board is ultimately responsible for risk management within CRH. The Board has delegated responsibility for the monitoring of the effectiveness of the Group's risk management and internal control systems to the Audit Committee. Such systems are designed to manage, rather than eliminate, the risk of failure to achieve business objectives.

The Audit Committee in turn monitors the activities of various functions including; Group Regulatory, Compliance & Ethics, Group IT Governance, Group Finance and Group Risk. Group Internal Audit is charged with independently assessing and reporting on the risk management initiatives implemented by these functions.

The Board and Audit Committee receive, on a regular basis, reports from management on the key strategic, operational, compliance, financial and other risks to the business and the steps being taken to manage/mitigate such risks. They also consider whether the significant risks faced by the Group are being identified, evaluated and appropriately managed. The Audit Committee reviews the list of principal risks and uncertainties disclosed on pages 102 to 107.

### Our Risk Assessment Process

CRH's risk management process operates to ensure a comprehensive evaluation of risks is performed and is the subject of continuous improvement. CRH operates both a top-down and bottom-up risk assessment to ensure that risks presented to the Audit Committee and Board are representative of the risks faced by our business in strategy execution. The risk management cycle operates as follows:



#### Identify and Assess

Management identifies risks as part of their day-to-day activities and is required to conduct a robust assessment of these risks. The following factors are taken into consideration:

- The nature and extent of risks facing the Group, including emerging risks
- Risk appetite and risk tolerance
- The likelihood of the risk materialising
- The impact and velocity in the event that the risk materialises
- The mitigation strategies implemented in order to manage the risks
- The monitoring processes in place to determine and respond to the effectiveness of mitigation strategies

Management is required to assess all risks which could have an impact on the current or future operation of the business and to document these risks in a standardised template. Risks are assessed in terms of their financial and operational impact should they occur and their likelihood of occurrence, using a defined risk scoring methodology.

Risk velocity, the speed at which a risk impacts the business, is an important constituent of this evaluation.

#### Manage and Monitor

In line with our ongoing focus on continuous process improvement, risks are assessed by management on an inherent/gross basis (prior to mitigation strategies) and a residual/net basis (post mitigation strategies). Where the gross risk score determines the risk to be material, appropriate mitigation strategies are implemented to bring the residual risk to a level which is within risk appetite and tolerance levels approved by the Board.

The Risk Appetite and Tolerance Framework is a critical component of CRH's risk governance system through defining the key risk parameters within which strategic decision making takes place. The Board approves the Risk Appetite and Tolerance Framework on an annual basis in line with best corporate governance practice.

#### Report

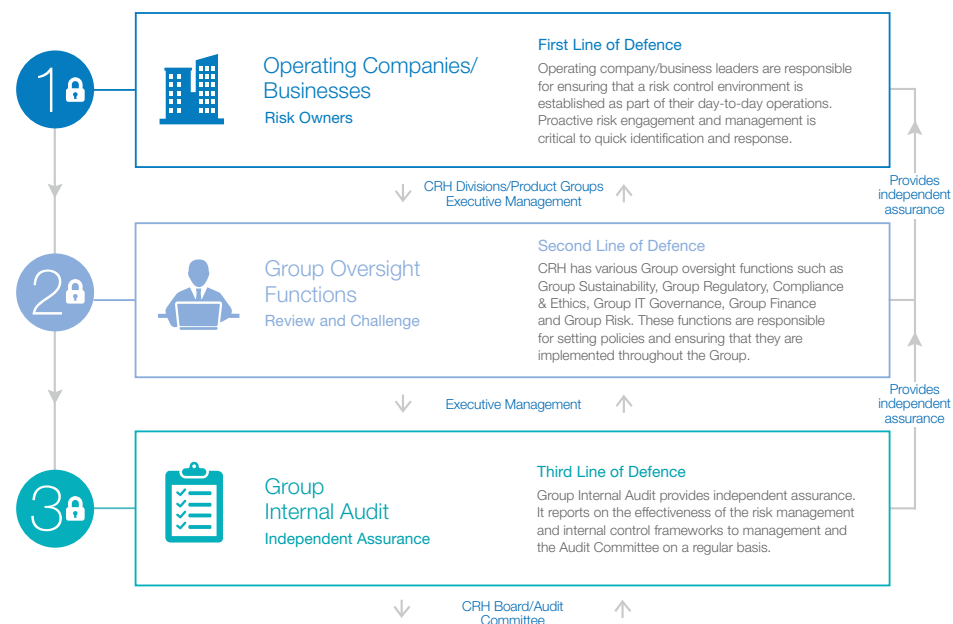
The Group level Risk Register, which is compiled by the Group Risk function, highlights those risks which may impede the realisation of core strategic objectives. The risks are fed up from our businesses through the bottom-up assessment which forms the basis of our Register. Additional strategic and Group-related risks are added to ensure the risks highlighted on pages 102 to 107 of this report are reflective of the barriers to the realisation of our business strategy. These risks form the basis of Board and Audit Committee communications and discussions.

#### Viability Statement

Our Viability Statement, which does not form part of the Annual Report and Form 20-F, as filed with the SEC, has been prepared in accordance with the UK Corporate Governance Code 2016 and is set out on page 98 of the Directors' Report.

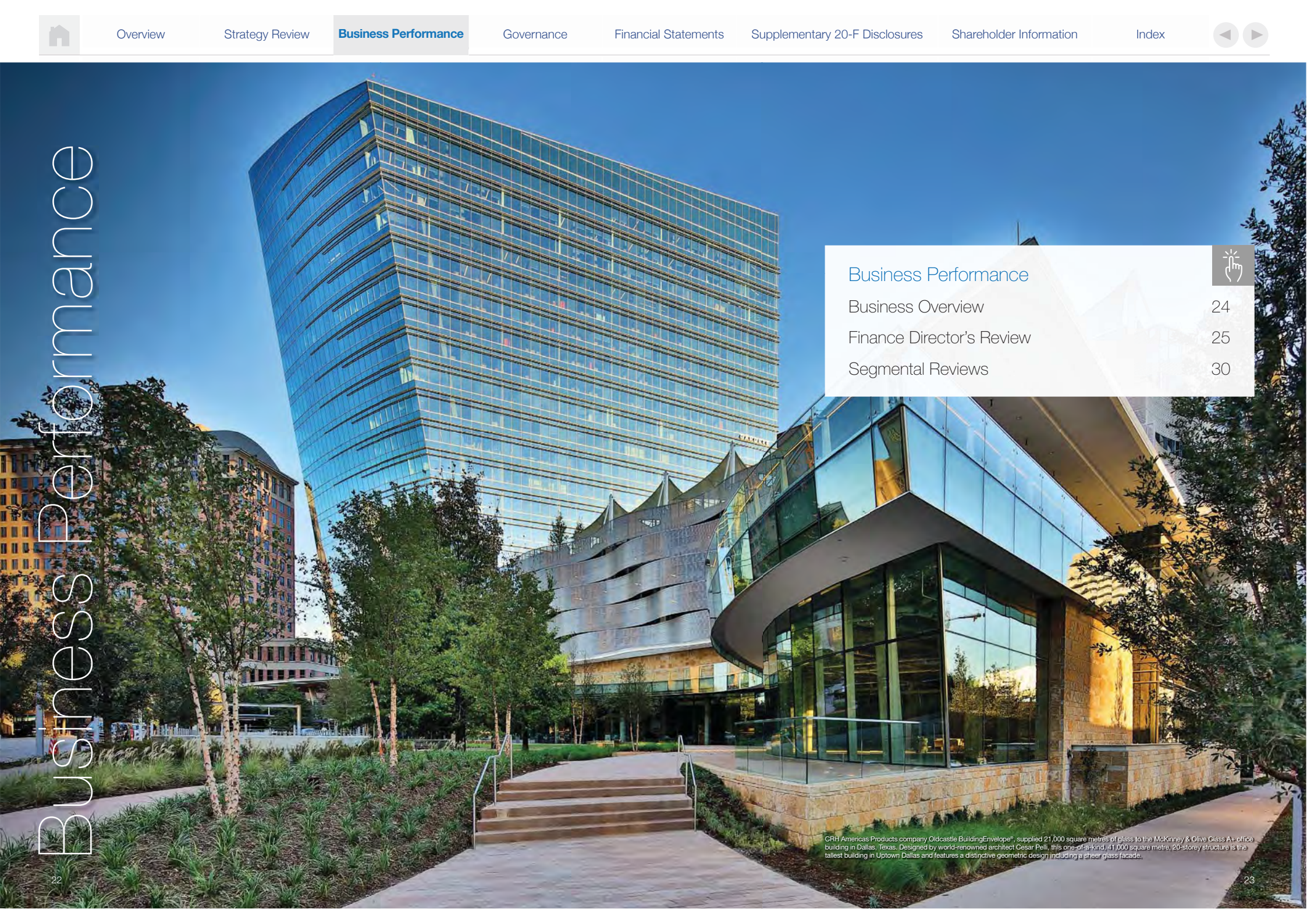
## CRH Risk Management Framework

### Our Three Lines of Defence





# Business Performance



## Business Performance



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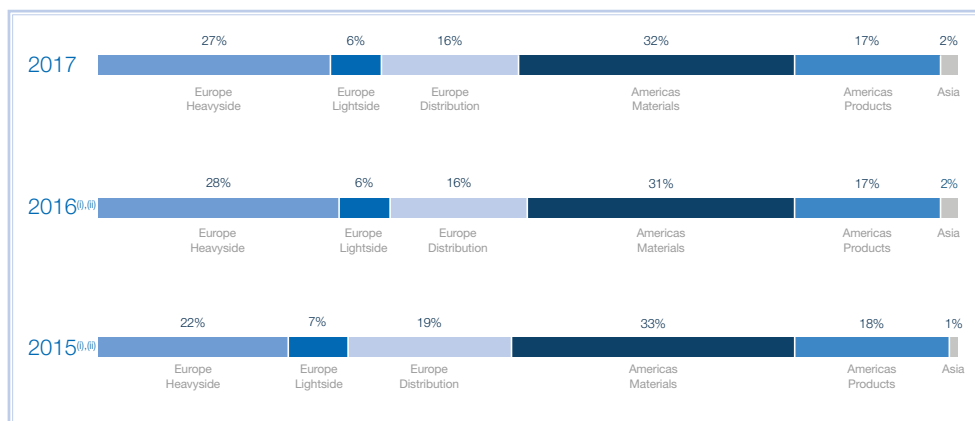
CRH Americas Products company Oldcastle BuildingEnvelope<sup>®</sup>, supplied 21,000 square metres of glass to the McKinney & Olive Class A+ office building in Dallas, Texas. Designed by world-renowned architect Cesar Pelli, this one-of-a-kind, 41,000 square metre, 20-storey structure is the tallest building in Uptown Dallas and features a distinctive geometric design including a sheer glass facade.



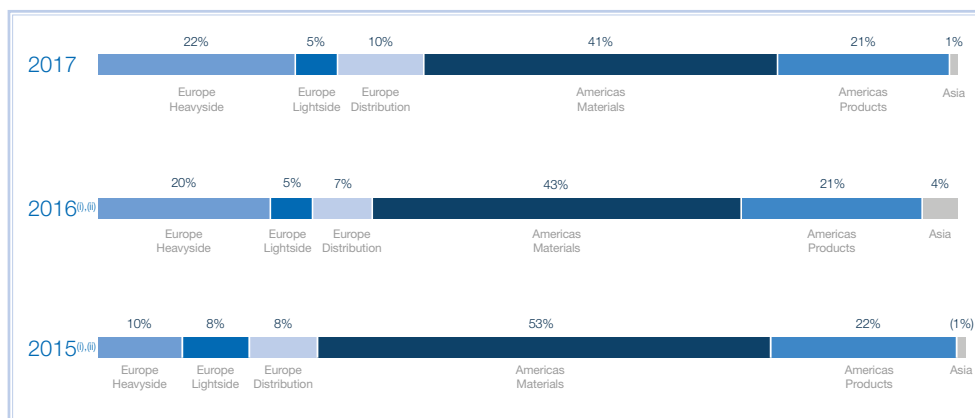
## Business Overview

The percentage of Group revenue and operating profit for each of the reporting segments for 2017, 2016 and 2015 is as follows:

### Revenue



### Operating Profit



<sup>(i)</sup> During 2017 the Americas Distribution segment was classified as discontinued operations. Comparative amounts for 2016 and 2015 have been restated.

<sup>(ii)</sup> During 2017, our dedicated European landscaping businesses previously included within our Europe Heavyside segment were reorganised to form a new platform, Architectural Products, within our Europe Lightside segment. Comparative segment amounts for 2016 and 2015 have been restated where necessary to reflect the new format for segmentation.

## Finance Director's Review 2017†

2017 was a year of growth for CRH with increases in underlying demand in the Americas, and continued positive momentum in Europe, while very competitive market conditions remained in Asia. With a constant focus on performance in all our businesses, coupled with our vertically integrated business model for heavyside materials, good operational leverage underpinned improved margins and returns in our American and European Divisions. The Group also maintained a focus on cash generation and appropriate deployment of capital as operating cash flow for the year amounted to €2.2 billion (2016: €2.3 billion) and year-end net debt increased by €0.5 billion to €5.8 billion (2016: €5.3 billion) despite acquisition spend net of disposal proceeds increasing to €1.7 billion (2016: net inflow €0.1 billion).

### Key Components of 2017 Performance

The overall sales movement in the year was a combination of the performance of each of the individual segments as noted below.

Despite hurricane activity and record levels of rainfall during the year, our Americas operations benefited from the continuation of stable market fundamentals in the US and good underlying demand. An organic sales\* increase of 3% in our Americas Materials Division was supported by continued growth in the residential and non-residential sectors, while infrastructure remained relatively stable in our markets. In Americas Products, sales were broadly in line with prior year as good growth along the West Coast and parts of the South and Southeast were partly offset by more modest trading in Canada and parts of the Northern US.

In Europe, total sales were up 1% compared with 2016 and organic sales were 2% ahead due to continued recovery in key markets. Europe Heavyside's outturn was positive, with a broad-based recovery in Ireland, France, Poland and Finland more than offsetting more subdued activity in Switzerland and the UK. Europe Lightside experienced a year of further progress as good performances in a number

of our main markets resulted in sales finishing 3% ahead of 2016. The backdrop at Europe Distribution was stable as a strong contribution from the Netherlands together with solid demand in Belgium and Germany was partly offset by continued challenges in Switzerland.

In Asia, economic growth and market fundamentals remained robust in the Philippines, with both residential and non-residential demand stable, though infrastructure investment was slower than expected and pricing remained very competitive. In India, a favourable economic backdrop continued to drive demand, while reduced construction activity in China had a negative impact on volumes but this was more than offset by stronger pricing.

Americas Distribution, which has been classified as discontinued operations for reporting purposes, benefited from good underlying demand, particularly for Exterior Products.

EBITDA (as defined)\* from continuing and discontinued operations for the year amounted to €3.3 billion, a 6% increase on 2016 (2016: €3.1 billion) and reported profit after tax\* was €1.9 billion (2016: €1.3 billion).

The euro strengthened against most major currencies during 2017, particularly towards the end of the year resulting in the average euro/Pound Sterling rate weakening from 0.8195 in 2016 to 0.8767 in 2017 and the US Dollar weakening from an average 1.1069 in 2016 to 1.1297 in 2017. Overall currency movements resulted in an unfavourable net foreign currency translation impact on our results as shown on the table on page 26. The average and year-end 2017 exchange rates of the major currencies impacting on the Group are set out on page 134.

The underlying results for the year were augmented by two one-off items; a past service credit of €81 million due to changes in a Swiss pension scheme and a €447 million

reduction in the Group's net deferred tax liabilities†† due to changes in tax legislation related to the enactment of the "Tax Cuts and Jobs Act" in the US during 2017.

“ 2017 was a year of growth for CRH, with increases in underlying demand in the Americas and continued positive momentum in Europe ”

Senan Murphy, Finance Director



† See cautionary statement regarding forward-looking statements on page 97.

\* EBITDA is defined as earnings before interest, taxes, depreciation, amortisation, asset impairment charges, profit on disposals and the Group's share of equity accounted investments' profit after tax.

▲ Details of how non-GAAP measures are calculated are set out on pages 210 to 213.

† Profit after tax and earnings per share are as reported in the Consolidated Income Statement on page 120.

†† Net deferred tax liabilities reduction of €447 million is stated on a continuing (€440 million) and discontinued (€7 million) basis.



## Finance Director's Review 2017 - continued

### Key Components of 2017 Performance

€ million	Sales revenue	EBITDA (as defined)*	Operating profit	Profit on disposals	Finance costs (net)	Assoc. and JV PAT (i)	Pre-tax profit
2016	24,789	2,980	1,908	53	(383)	42	1,620
Exchange effects	(479)	(74)	(53)	(1)	6	1	(47)
2016 at 2017 rates	24,310	2,906	1,855	52	(377)	43	1,573
Incremental impact in 2017 of:							
- 2016/2017 acquisitions	596	60	14	-	(8)	-	6
- 2016/2017 divestments	(204)	(21)	(14)	(3)	1	-	(16)
- LH Assets integration costs (ii)	-	45	45	-	15	-	60
- Swiss pension past service credit (iii)	-	81	81	-	-	-	81
- Early bond redemption	-	-	-	-	(18)	-	(18)
- Organic	518	75	114	7	38	22	181
2017	25,220	3,146	2,095	56	(349)	65	1,867
% Total change	2%	6%	10%				15%
% Organic change	2%	3%	6%				12%

(i) CRH's share of after-tax profits of joint ventures and associated undertakings.

(ii) LH Assets integration costs of €45 million were incurred in 2016. In addition, following the related debt restructuring, finance costs reduced by €15 million in 2017.

(iii) 2017 includes a one-off past service credit of €81 million due to changes in the Group's pension scheme in Switzerland.

### Liquidity and Capital Resources - 2017 compared with 2016

The comments that follow refer to the major components of the Group's cash flows for 2017 and 2016 as shown in the Consolidated Statement of Cash Flows on page 124.

Throughout 2017 the Group remained focused on cash management. Operating cash flow decreased marginally to €2.2 billion (2016: €2.3 billion) with net working capital outflow for the year of €209 million (2016: €56 million inflow) reflecting trends in overall sales, seasonal weather patterns and the impact of acquisitions in the final quarter of the year. Working capital of €1.8 billion at year end (2016: €2.1 billion) represented just 7.2% of sales (2016: 8.5%), continuing the downward movement in this metric for the Group since 2011. CRH believes that its current working capital is sufficient for the Group's present requirements.

Focused spending on property, plant and equipment in markets and businesses with increased demand backdrop and efficiency requirements, particularly in the Americas, resulted in higher cash outflows of €1.0 billion (2016: €853 million), with spend in 2017 representing 104% of depreciation (2016: 85%).

During the year the Group spent €1.9 billion on 34 transactions (2016: €213 million) which was partly financed by divestment and disposal proceeds of €222 million (net of cash disposed and deferred proceeds) (2016: €283 million).

Cash dividend payments of €477 million (2016: €360 million) reflect the Group's continued focus on returns to shareholders. Net proceeds of €42 million from share issues in 2017 were similar to last year (2016: €52 million).

Year-end interest-bearing loans and borrowings increased by €0.2 billion to €8.0 billion (2016: €7.8 billion). At year end,

the stronger euro against both the US Dollar and Pound Sterling had a positive translation impact on net debt.

Reflecting all these movements, net debt of €5.8 billion at 31 December 2017 was €0.5 billion higher than year-end 2016 (€5.3 billion). The Group is in a good financial position. It is well funded and net interest cover (EBITDA (as defined)/net debt related interest costs) is 10.9x (2016: 9.4x). As set out in note 24 to the Consolidated Financial Statements the Group is significantly in excess of the minimum requirements of its covenant agreements.

In May 2017, the Group successfully issued a total of US\$1.0 billion dollar bonds comprised of a US\$0.6 billion 10-year bond at a coupon rate of 3.4% and a US\$0.4 billion 30-year bond at a coupon rate of 4.4%. Concurrently, an any-and-all tender offer was made for the US\$0.65 billion bond due in 2018, with the final result being that US\$0.36 billion were validly tendered and accepted for purchase, which

gave rise to a one-off charge of €18 million. The early redemption of these Notes results in overall net interest savings for the Group in 2017 and 2018.

The bond issues reflect CRH's commitment to prudent management of our debt and the timing of the related maturities and also to maintaining an investment grade credit rating.

The Group ended 2017 with total liquidity of €5.7 billion comprising €2.1 billion of cash and cash equivalents on hand and almost €3.6 billion of undrawn committed facilities (which are available until 2022). At year end the cash balances were enough to meet all maturing debt obligations for the next 3.6 years and the weighted average maturity of the remaining term debt was 10.5 years.

CRH also has a US\$1.5 billion US commercial paper programme and a €1.5 billion Euro commercial paper programme. The purpose of these programmes is to provide short-term liquidity at attractive terms. There was no commercial paper outstanding under either of these programmes at 31 December 2017.

Contractual obligations and Off-Balance Sheet arrangements are disclosed on page 214 of this Annual Report and Form 20-F.

### Segmental Reviews

The sections on pages 30 to 53 outline the scale of CRH's continuing operations in 2017, and provide a more detailed review of performance in each of CRH's reporting segments. As set out in note 1 to the Consolidated Financial Statements (page 135), following the agreement to sell the Americas Distribution business, the Group has six reporting segments. A review of the discontinued operations, Americas Distribution, is also included on pages 54 and 55 for information.

### Development Review

#### 2017

In 2017, the Group spent a total of €1.9 billion (including deferred and contingent consideration in respect of prior year acquisitions) (2016: €0.2 billion) on 34 (2016: 24) acquisition/investment transactions. On the investment front, the Group realised business and asset disposal proceeds of €0.2 billion (2016: €0.3 billion).

In the Americas, c. €1.3 billion was spent on 21 acquisitions and one investment. Our Materials Division completed the largest 2017 acquisition at the end of November with the acquisition of Suwannee American Cement together with certain other materials assets in Florida. The total assets acquired consist of a 1 million tonne cement plant in North Central Florida, 18 readymixed concrete plants, an aggregates quarry, two block plants and nine gunite facilities. The Materials Division also completed 12 further bolt-on acquisitions, including two in Canada, adding c. 2.5 billion tonnes of additional aggregates reserves. The Products Division completed eight acquisitions and one investment in 2017 at a cost of c. €0.2 billion.

In Europe, c. €0.6 billion was spent on ten acquisitions and two investments. This is split between eight acquisitions and one investment in Europe Heavyside and two acquisitions and one investment in Europe Distribution.

The largest acquisition in Europe in 2017 was that of the Fels lime business which was acquired at the end of October 2017. Fels has significant high-quality limestone reserves and 11 production locations; nine in Germany and one in both the Czech Republic and Russia. The majority of production capacity is situated in the Harz region of East Germany, providing a strong platform for future growth.

Business divestments during 2017, all in Europe, generated net proceeds of c. €85 million. The remaining clay products businesses in Europe (Belgium, Germany, Netherlands and Poland) were divested and our Heavyside Division also sold its civil prefabricated concrete businesses in the Benelux, along with seven other small non-core businesses. In addition to these business divestments, the Group realised proceeds of c. €137 million from the disposal of surplus property, plant and equipment.

As previously announced, CRH completed the sale of its Americas Distribution business on 2 January 2018 for proceeds of US\$2.6 billion. In addition, we reached an agreement with the Board of Ash Grove Cement to acquire a portfolio of cement and other materials assets. The deal is due to close in 2018 and will give CRH a market leadership position in the North American cement market for the first time.



## Finance Director's Review 2016

The overall trading backdrop in 2016 was positive with good momentum in both the Americas and Europe, albeit at different paces, supported by a good performance from the newly established Asia Division. In addition, our businesses benefited from favourable weather patterns in the Americas at the start of 2016. With a relentless focus on performance in all our businesses, coupled with our vertically integrated business model for heavyside materials, good operational leverage underpinned improved margins and returns. Following the two major acquisitions of the LH Assets and CRL in the second half of 2015, the Group focused in 2016 on completing their integration, extracting synergies and on prudent financial management to return debt metrics to normalised levels. With this focus, €89 million of synergies were realised while operating cash flow for the year amounted to €2.3 billion (2015: €2.2 billion) and year-end 2016 net debt finished at €5.3 billion (2015: €6.6 billion).

### Key Components of 2016 Performance

Overall sales of €24.8 billion for 2016 were 16% ahead of 2015 reflecting the inclusion of full-year 2016 results from the two major acquisitions, while organic sales from operations were up 3%, reflecting positive momentum in the Group's major markets.

An increase of 9% in the Americas' sales reflected the inclusion of the Canadian element

of the LH Assets and CRL. Organic sales from operations increased 2% in 2016 benefiting from favourable early weather with more normalised demand patterns experienced in the second half of 2016. Americas Materials benefited from stable federal funding underpinned by increased state spending and improved non-residential activity. At Americas Products, continued positive momentum in construction markets was supported by low interest rates and increasing employment. With higher sales and good cost control, profits and margins improved in our Americas segments. Our former reporting segment Americas Distribution (now disclosed as discontinued operations) also benefited from the good underlying demand.

In Europe total sales were up 20% compared with 2015 and organic sales were 4% ahead on the back of continued recovery in some key markets. In addition to the full-year 2016 contributions from the LH Assets in the UK and mainland Europe, Europe Heavyside faced a mixed backdrop, benefiting from a broad-based recovery in the Netherlands, Ireland, Finland and Ukraine with more subdued activity in Switzerland and Poland. Europe Lightside experienced strong demand in key markets while Europe Distribution benefited from improving demand in the Netherlands with a more challenging backdrop in Switzerland.

The Asia Division reflects results from the Philippines operations acquired as part of the

LH Assets in the second half of 2015 together with CRH Asia's divisional costs. Separately, the Group's investments in India and China are equity accounted. In the Philippines, construction demand was supported by good economic growth, strong domestic consumption and low inflation. In India, a favourable economic backdrop continued to drive construction demand but pricing remained challenging while reduced construction activity in China had a negative impact on volumes and prices.

EBITDA (as defined)\* for 2016 amounted to €3.0 billion, a 43% increase on 2015 (€2.1 billion) and reported profit after tax† was €1.3 billion (2015: €0.7 billion).

In 2016, the euro strengthened versus most major currencies, particularly the Pound Sterling which weakened from an average 0.7258 in 2015 to 0.8195 in 2016. The effect of this was only partially offset by a small change in the average euro/US Dollar rate, which, despite strengthening towards the end of 2016, averaged 1.1069 for 2016 and was broadly similar to 2015 (1.1095). Overall currency movements resulted in an unfavourable net foreign currency translation impact on our results as shown in the table below. The average and year-end 2016 exchange rates of the major currencies impacting on the Group are set out on page 134.

The two major 2015 acquisitions (the LH Assets and CRL) account for the vast majority of the acquisition impact included in the table on page 28.

### Liquidity and Capital Resources – 2016 compared with 2015

The comments that follow refer to the major components of the Group's cash flows for 2016 and 2015 as shown in the Consolidated Statement of Cash Flows on page 124.

Following the significant acquisition spend in 2015, prudent financial management to return debt metrics to normalised levels was a key objective for 2016. The Group focused on working capital in particular, and operating cash flow increased to €2.3 billion (2015: €2.2 billion). Year-end 2016 working capital of €2.1 billion delivered a net positive movement (inflow) for the year of €56 million (2015: €585 million).

Strong control of spending on property, plant and equipment concentrating on markets and businesses with increased demand backdrop and efficiency requirements resulted in lower cash outflows of €853 million (2015: €882 million).

During 2016 the Group spent €213 million on 24 bolt-on transactions (2015: €7.4 billion) which was financed by divestment and disposal proceeds of €283 million (net of cash disposed and deferred proceeds) (2015: €889 million).

Cash dividend payments of €360 million (2015: €383 million) reflect the Group's continued focus on returns to shareholders. Net proceeds of €52 million from share issues in 2016 was significantly less than 2015 proceeds of €1.6 billion due to the 74 million shares placed in February of that year in connection with the acquisition of LH Assets.

Year-end 2016 interest-bearing loans and borrowings decreased by €1.4 billion to €7.8 billion (2015: €9.2 billion). The strengthening of the US Dollar versus the euro at 31 December 2016 (versus 31 December 2015) had a negative impact on net debt, but this was offset by the positive translation impact of a weakening Pound Sterling, such that the net translation impact was broadly neutral.

## Development Review

### 2016

In 2016, the Group completed 21 bolt-on acquisitions and three investment transactions for a total spend of €213 million (including deferred and contingent consideration in respect of prior year acquisitions). In Europe, eight acquisitions and two investments with a total spend of c. €43 million were completed. Our Heavyside business acquired 11 readymixed concrete plants in the UK, three quarries in Ireland, an aggregates terminal in Belgium and entered into a sand & gravel joint venture in France, adding reserves of 11 million tonnes. Further investments were also made to buy out a minority position in Spain and add to an existing joint venture in Ireland. Our Lightside Division completed two acquisitions in the UK. The Distribution Division acquired a small builders merchant in Austria. In the Americas, c. €170 million was spent on 13 acquisitions and one investment. Our Materials Division completed eight bolt-on acquisitions and one investment in 2016. The principal acquisition was of a significant aggregates and asphalt operation in Utah. Seven further bolt-on acquisitions were completed. In total 93 million tonnes of permitted reserves were added during the year. The Products Division completed five acquisitions, the largest of which was of a Canadian exterior surfaces company which was a strong addition to the core hardscape business of our Architectural Products Group (APG). Three precast bolt-on operations were also acquired. Finally, a glass hardware company was added in Perth, Australia.

On the divestment front, the Group completed 13 transactions and realised total business and asset disposal proceeds of €283 million in 2016. Business divestments during 2016 generated net proceeds of €123 million. In Europe, our Distribution Division disposed of a roofing products company in the Netherlands while the Heavyside business divested of operations in Poland, Switzerland and Romania. Two small joint venture holdings in France and Germany were also divested. The Americas Materials Division disposed of select aggregates and asphalt operations in Missouri, a small waterproofing business in Michigan and a readymixed concrete operation in Iowa and Minnesota. Certain aggregates assets in Oregon and Montana were also disposed in a cash

neutral swap. Finally, our Americas Products Division disposed of a pavement products operation, certain precast operations in Canada and the assets of a burial vaults business.

### 2015

In 2015, the Group completed 20 bolt-on acquisition and investment transactions. These deals, together with the acquisition of the LH Assets, the CRL acquisition and net deferred consideration payments, brought development spend for 2015 to approximately €8 billion (including debt arising in acquired companies).

In Europe, four bolt-on acquisitions and one investment with a total cost of €20 million were completed. Our Lightside business completed two acquisitions; one in Australia and a concrete paviour production plant in Poland, as well as a small further investment in the Netherlands. Our Heavyside operations set up a new joint venture with its existing readymixed concrete operations in St. Petersburg, Russia. Our Distribution business acquired the plumbing operations of a steel and tool merchant in Switzerland. Ten bolt-on acquisitions and two investments were completed by our Americas Materials Division in 2015 adding over 253 million tonnes of aggregates reserves. Our Americas Products Division completed three transactions in 2015.

A total of 30 divestments, together with asset disposals generated proceeds of €1 billion in 2015; the largest of which was the sale of clay and certain concrete products operations in the UK and the Group's clay business in the US for €0.43 billion. Our Europe Heavyside business completed 13 further divestments in 2015, the largest of which was the disposal of CRH's 25% equity stake in its Israeli operation. Other disposals comprised a number of non-core readymixed concrete and concrete products businesses. One small disposal was completed by the Europe Lightside Division, while the Distribution Division disposed of its 45% stake in Doras, a builders merchant in France. In the Americas, our Materials Division disposed of five non-core operations. Our Products Division sold six operations across the US, including the disposal of Merchants Metals, a national distributor of fencing systems and perimeter control products. The Products Division also divested of all of its businesses in Argentina and Chile.

### Key Components of 2016 Performance

€ million	Sales revenue	EBITDA (as defined)*	Operating profit	Profit on disposals	Finance costs (net)	Assoc. and JV PAT (i)	Pre-tax profit
2015	21,406	2,079	1,166	99	(389)	44	920
Exchange effects	(338)	(29)	(11)	(7)	3	1	(14)
2015 at 2016 rates	21,068	2,050	1,155	92	(386)	45	906
Incremental impact in 2016 of:							
- 2015/2016 acquisitions	3,624	546	337	-	(33)	2	306
- 2015/2016 divestments	(506)	(29)	(13)	(51)	3	(14)	(75)
- LH Assets integration costs (ii)	-	152	152	-	-	-	152
- Swiss fine	-	32	32	-	-	-	32
- Early bond redemption	-	-	-	-	38	-	38
- Organic	603	229	245	12	(5)	9	261
2016	24,789	2,980	1,908	53	(383)	42	1,620
% Total change	16%	43%	64%				76%
% Organic change	3%	11%	21%				29%

(i) CRH's share of after-tax profits of joint ventures and associated undertakings.

(ii) LH Assets integration costs of €45 million were incurred in 2016 (2015: €197 million).

\* EBITDA is defined as earnings before interest, taxes, depreciation, amortisation, asset impairment charges, profit on disposals and the Group's share of equity accounted investments' profit after tax.

† Profit after tax and earnings per share are as reported in the Consolidated Income Statement on page 120.



# Segmental Reviews

## Segmental Reviews



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Echelon Masonry, an Oldcastle Architectural company and part of GRH Americas Products Division, supplied the Mesa Community College Performing Arts Center with an inner and outer shell of sound-reflective materials. A variety of masonry was chosen both for structure and finish, with the exterior shell required to be resilient to Arizona's extreme climate.



# Europe Heavyside

With market leading positions and a wide geographic reach, CRH is the number one Heavyside Materials business in Europe. Our Europe Heavyside Division comprises aggregates, cement, lime, concrete products operations and asphalt.

## What we do:

Europe Heavyside's vertically integrated business is founded in resource-backed cement and aggregates assets, which support the manufacture and supply of aggregates, asphalt, lime, cement and readymixed concrete. Our materials are used extensively in a wide range of construction projects from major public infrastructure, to commercial buildings and residential structures. Customers typically range from national, regional and local governments, to building contractors and other construction product and service providers. In addition to an ability to leverage the benefits of scale and best practice, our businesses are differentiated in their markets by a proven track record in understanding the unique needs of local customers and successfully delivering for those customers.

## How we create value:

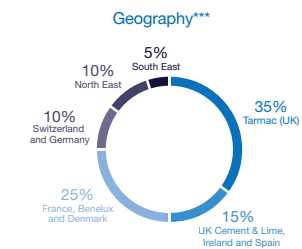
Our portfolio of businesses is managed through a focus on value creation. We place great emphasis on performance improvement initiatives across our businesses and seek to create value through optimisation of the asset base, maximising Group synergies and leveraging commercial and operational excellence.

The scale of our operations provides economies in purchasing and logistics management. Our commitment to sustainability is evidenced by extensive use of alternative fuels and the manufacture of low carbon cements. Enhanced alignment and collaboration leads to value creation throughout our extensive network of well-invested facilities. With a strong pipeline of opportunities across regions, our development strategy is focused on identifying and integrating bolt-on acquisitions for synergies, reserves and further vertical integration, in addition to opportunities in contiguous regions to extend and strengthen regional positions.

## How we are structured:

The Division is organised into six primarily geographical regions to leverage market synergies and economies of scale, with a small number of central support functions. The regions are 1) Tarmac (UK); 2) UK Cement & Lime, Ireland and Spain; 3) France, Benelux and Denmark; 4) Switzerland and Germany; 5) North East: Finland, Estonia, Poland, Ukraine; 6) South East: Hungary, Romania, Serbia and Slovakia. Europe Heavyside employs approximately 24,400 people at close to 1,150 locations.

	€ million	% of Group
Sales	6,902	27%
Operating Profit	478	22%
EBITDA (as defined)*	839	27%
Net Assets**	6,291	30%



Sector	Percentage
Residential	35%
Non-Residential	30%
Infrastructure	35%

End-use	Percentage
New	70%
RMI	30%

## Products and Services Locations

- Cement**  
Belgium, Finland, France, Germany, Hungary, Ireland, Netherlands, Poland, Romania, Serbia, Slovakia, Spain, Switzerland, Ukraine, United Kingdom
- Aggregates**  
Czech Republic, Estonia, Finland, France, Germany, Ireland, Netherlands, Poland, Romania, Serbia, Slovakia, Spain, Switzerland, Ukraine, United Kingdom
- Asphalt**  
Ireland, Poland, Switzerland, United Kingdom
- Lime**  
Czech Republic, Germany, Ireland, Poland, Russia, United Kingdom
- Readymixed Concrete and Concrete Products**  
Belgium, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Netherlands, Poland, Romania, Slovakia, Spain, Switzerland, Ukraine, United Kingdom

**Annualised Sales Volumes†** Cement: 27.1m tonnes; Aggregates: 118.7m tonnes (121.4m tonnes††); Asphalt: 10.7m tonnes; Readymixed Concrete: 16.5m m³; Lime: 4.1m tonnes; Concrete Products: 5.8m tonnes



### Aggregates

Aggregates are naturally occurring mineral deposits such as granite, limestone and sandstone. Our Europe Heavyside businesses extract these deposits and process them for sale. They are supplied as a range of aggregates products principally for use in general construction and civil engineering projects and are also used in a variety of additional CRH product lines including asphalt and readymixed concrete. Recycled concrete also increasingly features as an aggregate. For additional information on the location and adequacy of all of the Group's mineral reserves, see the Mineral Reserves section on pages 216 and 217.

### Cement

Cement is a primary building material used in the construction industry. It is used principally as an agent to bind other materials together. Most commonly it is mixed with sand, stone or other aggregates and water to form concrete. The Europe Heavyside Division has cement operations in 15 countries across Europe. Cement customers are mainly concrete producers, including CRH concrete operations and builders merchants supplying construction contractors and others. While cement may be imported from other countries, competition comes mainly from other large cement producers located within each country.

### Lime

Europe Heavyside's lime businesses produce and supply a wide range of specialist products for the agricultural, environmental, industrial and construction sectors. CRH Lime has operations in the UK, Ireland and Poland, with further operations added during 2017 in Germany, Czech Republic and Russia through the Fels acquisition. CRH is now the second largest producer of lime in the European market.

### Readymixed Concrete

Readymixed concrete is a highly versatile building material comprised of aggregates bound together with cement and water. Europe Heavyside's businesses sell annual volumes of over 16 million cubic metres, manufactured mainly at locations with aggregates on site, and delivered to construction sites in fluid form.

### Concrete Products

In addition to readymixed concrete, CRH manufactures other concrete products, primarily floor and wall elements, beams and vaults for structural use. Principal raw materials include cement, crushed stone and sand and gravel, all of which are readily available locally. Readymixed concrete and concrete products are sold to both the public and private construction sectors. Competition comes mainly from other readymixed concrete and concrete products producers, as well as from a variety of smaller manufacturers in local economies.

### Asphalt

Asphalt is the primary building material used in road surfacing and other infrastructure including airport runways. It consists of aggregates bound together with bitumen, a by-product of the oil industry. Europe Heavyside's businesses in the UK (under the Tarmac brand), Ireland, Poland and Switzerland are involved in the production and supply of asphalt. Customers are typically government and local authorities involved in the construction and maintenance of national road networks.

\* EBITDA is defined as earnings before interest, taxes, depreciation, amortisation, asset impairment charges, profit on disposals and the Group's share of equity accounted investments' profit after tax.  
 \*\* Net Assets at 31 December 2017 comprise segment assets less segment liabilities as disclosed in note 1 to the Consolidated Financial Statements.  
 \*\*\* Geography, sector exposure and end-use balance are based on sales.

† Throughout this document annualised volumes have been used which reflect the full-year impact of acquisitions made during the year and may vary from actual volumes sold.  
 †† Including the Group's share of equity accounted investments.



# Operations Review - Europe Heavyside

## Prior Year 2016

Results € million	2015	Analysis of change					2016	% change
		Exchange	Acquisitions	Divestments	LH Costs	Organic		
Sales revenue	4,813	-224	+2,129	-111	-	+338	<b>6,945</b>	<b>44%</b>
EBITDA (as defined)*	424	-21	+299	-11	+89	+1	<b>781</b>	<b>84%</b>
Operating profit	120	-3	+183	-7	+89	+4	<b>386</b>	<b>222%</b>
EBITDA (as defined)/sales	8.8%						<b>11.2%</b>	
Operating profit/sales	2.5%						<b>5.6%</b>	

LH integration costs of €32 million were incurred in 2016 (2015: €121 million)  
The LH integration costs refers to the businesses acquired from LafargeHolcim in 2015

During 2017, our dedicated European landscaping businesses previously included within our Europe Heavyside segment were reorganised to form a new platform, Architectural Products, within our Europe Lightside segment. Comparative segment amounts for 2016 and 2015 have been restated where necessary to reflect the new format for segmentation.

Trends were mixed across our major European markets in 2016 with more challenging conditions in our businesses in Switzerland and Poland contrasted by evident market recovery in Ireland, Ukraine, Finland and the Netherlands.

Sales and operating profit were well ahead of 2015, reflecting stable results in our heritage businesses and a full year's trading and synergy benefits of 2015 acquisitions. Organic profit in the heritage businesses was assisted by volume improvements and by ongoing cost saving and efficiency measures which largely offset the impact of a challenging pricing environment in some of our key markets.

### Tarmac (UK)

With a full year of trading included in the results, volumes in our aggregates and readymixed concrete business lines in the UK grew in 2016 against a stable construction backdrop. Price increases were achieved in all products except asphalt where the impact of lower prices was compensated by lower input (bitumen) costs. Despite uncertainty surrounding the UK construction market in light of the decision of the electorate in June to exit the European Union, 2016 was a year of progress for Tarmac.

### UK Cement & Lime, Ireland and Spain

Despite an overall backdrop of modest growth in the cement market, the UK cement and lime operations delivered strong volumes and prices in all product categories. Together with the Irish and Spanish cement businesses, the focus on network optimisation resulted in the achievement of synergies in 2016.

In Ireland, while cement volumes grew strongly (18%), domestic pricing in particular remained under pressure due to overcapacity in the market.

With the benefit of improved cement pricing on exports to the UK, stronger overall volumes and improved domestic concrete and aggregates prices, operating profit was ahead of 2015.

In Spain, the macroeconomic situation remained weak but stable, with some regional recovery. Prices remained under pressure, and despite some improvement in cement and readymixed concrete volumes, operating profit was lower than 2015.

### France, Benelux and Denmark

Our French cement operations delivered growth in volumes, primarily due to the inclusion of a full year of ownership of the LH Assets, as well as the positive impact of synergies with CRH heritage businesses and a modest recovery in the cement market, although prices remained under pressure due to strong competition and overcapacity.

Continued challenging pricing also impacted our precast business in France, although a focus on cost reduction initiatives across the business more than offset the underlying operating profit impact.

In the Netherlands, strong recovery of the residential market and an increase in centrally funded infrastructure projects delivered higher volumes in our readymixed and structural concrete operations. Readymixed concrete prices remained under continued pressure. There was some improvement in volumes and prices in Belgium.

In Denmark, with the benefit of a strong non-residential market and a year of growth in new residential construction, both volumes and prices in our structural business improved. Sales and operating profit were well ahead of 2015.

### Switzerland and Germany

Stable economic and construction output combined with an early start to the season in Switzerland led to growth in readymixed concrete volumes. However, cement prices declined

against a backdrop of continued pricing pressure arising from imports, and sales and operating profit were below 2015.

Strong cement volumes in our German operations reflected a full year of ownership of the LH Assets and growth in construction output, boosted mainly by new build multi-family housing. However, pricing remained under pressure in our cement business.

### North East

In Poland, weaker than expected activity adversely affected pricing in our cement and readymixed concrete products. Both sales and operating profit were behind 2015 due to the significant decline in cement volumes year-on-year.

In Finland, construction activity recovered strongly in 2016, and all our product categories reported growth in volumes; pricing remained under pressure due to overcapacity in readymixed concrete and increased cement imports. With the benefit of continued cost and efficiency initiatives, overall operating profit was ahead of 2015.

Despite the ongoing political conflict, construction activity in Ukraine increased year-on-year and our operations delivered strong trading, and operating profit was ahead of 2015. Cement volumes were up 11%, with prices also increasing in 2016. Inflation stabilised somewhat, positively impacting costs and operating profit.

### South East

After a promising start, 2016 was a mixed year in Romania, and mid-year construction activity slowed as a result of lower government spending and unfavourable weather conditions.

Strong growth in volumes and prices was delivered by our cement operations in Serbia due to ongoing large motorway projects in the south of the country. Similar to 2015, overcapacity and import pressure remained a threat in the region.

Although both Hungary and Slovakia experienced a drop in infrastructure spend, growth was solid in the residential market, with improved cement volumes and prices.

## Current Year 2017

Results € million	2016	Analysis of change					2017	% change
		Exchange	Acquisitions	Divestments	LH Costs/ Pension Credit	Organic		
Sales revenue	6,945	-203	+95	-110	-	+175	<b>6,902</b>	<b>-1%</b>
EBITDA (as defined)*	781	-26	+3	-17	+52	+46	<b>839</b>	<b>7%</b>
Operating profit	386	-16	-3	-14	+52	+73	<b>478</b>	<b>24%</b>
EBITDA (as defined)/sales	11.2%						<b>12.2%</b>	
Operating profit/sales	5.6%						<b>6.9%</b>	

Swiss pension plan past service credit of €20 million in 2017

LH integration costs of €32 million were incurred in 2016

The LH integration costs refers to the businesses acquired from LafargeHolcim in 2015

The commentary below excludes the impact of a past service credit due to pension plan amendments in Switzerland.

Overall the 2017 outlook for Heavyside was positive with market recovery in Ireland, France, Poland and Finland in particular compensating for more subdued trading conditions in Switzerland and the UK. Although total sales declined, modest year-on-year organic growth resulted in improved operating profit, due to strong operating leverage arising from volume growth in some key countries, signs of progress on pricing and a continued focus on performance improvement initiatives and synergies.

### Tarmac (UK)

Despite ongoing political and economic uncertainty in the UK, organic sales in our Tarmac business were ahead of 2016, with growth in building products and contracting sales and modest improvements in pricing for aggregates, asphalt and readymixed concrete compensating for a slight decline in overall volumes. Operating profit was slightly behind the prior year, with increased bitumen costs in the asphalt division not fully compensated by increased sales and the impact of performance improvement initiatives.

### UK Cement & Lime, Ireland and Spain

The UK cement and lime operations maintained stable pricing against a backdrop of modest economic growth, while improvements in production processes and synergies, achieved through network optimisation, further contributed to operating profit growth.

In Ireland, both sales and operating profit were ahead of 2016 mainly due to market recovery, particularly in the residential and commercial sectors, and the resulting growth in cement, aggregates and readymixed concrete volumes; positive trends on pricing across key products also contributed to sales and operating profit.

The performance in Spain advanced on prior year, with an improving macroeconomic situation.

### France, Benelux and Denmark

Both sales and operating profits in France benefited from increased volumes in all major products, particularly cement and readymixed concrete, driven by growth in the residential sector, although pricing remained challenging.

Organic sales in the Benelux grew in 2017 with a strong contribution from some larger projects in the Belgian structural business and continued growth in the Dutch residential sector; operating profit declined, impacted by a one-off cost in the structural business.

The 2017 outlook in Denmark was positive, with sales and operating profit significantly ahead of prior year supported by residential construction in major cities, some large non-residential projects and overall modest economic growth.

### Switzerland and Germany

Both sales and organic operating profit were behind prior year in Switzerland due to difficult market conditions, with overall domestic cement consumption also impacted by poor weather early in the year. With continued pricing pressure arising from imports, cement prices declined.

Lower cement volumes were experienced in our German operations due to reduced demand in key rural markets, a competitive landscape and individual project delays; results were behind 2016. Our new lime acquisition, Fels, performed in line with expectations.

### North East

Improvement in the residential sector and an overall positive economic backdrop resulted in cement volumes in Finland finishing ahead of 2016 and, despite competition from importers negatively affecting cement pricing, operating profit increased.

Overall economic growth was experienced in Poland, driven by private consumption and supported by EU-financed public spending. In addition, execution of previously delayed infrastructure projects resulted in growth in cement volumes and both sales and operating profit were well ahead of 2016.

Both sales and operating profit in Ukraine increased in 2017, with pricing improvement mitigating the impact of inflation and compensating for a decline in cement volumes, which were affected by an increased level of imports.

### South East

Our operations in Hungary and Slovakia benefited from solid economic and construction growth in 2017. Improved sales and operating profits were driven by higher cement and readymixed concrete volumes, some positive signs on pricing and an emphasis on performance improvement.

Although the mix of products and projects in Serbia negatively affected cement pricing, overall sales and operating profit were ahead of 2016, supported by both ongoing infrastructure projects and some residential growth.

Organic sales in Romania were slightly ahead of 2016, with poor weather in the early part of the year and slower than anticipated commencement of major infrastructure projects compensated by stronger volumes in the last quarter. Operating profits were ahead of 2016, positively impacted by continued price improvement and by performance improvement initiatives.





# Europe Lightside

CRH's Europe Lightside Division is comprised of businesses engaged in the manufacture and supply of high quality, value-added, innovative products and solutions for customers in construction markets globally.

## What we do:

We operate a portfolio of value-added product platforms across four business areas; Construction Accessories, Shutters & Awnings, Network Access Products & Perimeter Protection and Architectural Products. Customer understanding, product and process innovation and the relative ease with which certain of our products can be transported long distances, are all key features of this Division's business.

Our strategy is to build and grow scalable businesses, balanced across a range of products, geographies and end-use sectors, through increasing the penetration of our range of value-added products and creating competitive advantage through strong customer relationships, brand leadership and service. Our development strategy is to deepen our positions in existing business platforms, to broaden our differentiated product portfolio through selected new growth platforms that are exposed to attractive global megatrends, and to expand our presence in developing regions as construction markets in those regions become more sophisticated. This strategy complements CRH's aim to provide innovative solutions that meet the longer-term opportunities presented by economic development, changing demographics and sustainability.

## How we create value:

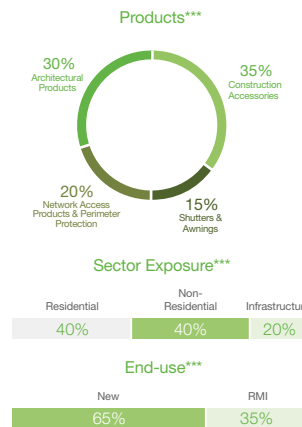
We realise commercial, operational and procurement synergies across the wider CRH network to benefit from scale and best practice. We also leverage a range of flagship brands at a regional, European and global level. There is a continuous focus on product innovation and development and we work with specialist end-users, such as architects and engineers, to develop design-solutions that are approved and certified for individual target markets.

We draw upon an established record of enabling mature and high-growth businesses to expand their offerings and develop their markets. Lightside has consistently achieved attractive returns; this reflects active, balanced management of our product range and our geographic and business cycle exposures.

## How we are structured:

CRH Europe Lightside is organised into four business areas: Construction Accessories, Shutters & Awnings, Network Access Products & Perimeter Protection and Architectural Products. The Division employs approximately 7,300 people at close to 180 locations.

	€ million	% of Group
Sales	1,440	6%
Operating Profit	102	5%
EBITDA (as defined)*	143	4%
Net Assets**	798	4%



## Products and Services Locations

### Construction Accessories

Australia, Austria, Belgium, China, France, Germany, Ireland, Italy, Malaysia, Netherlands, Norway, Poland, Spain, Sweden, Switzerland, United Kingdom

### Shutters & Awnings

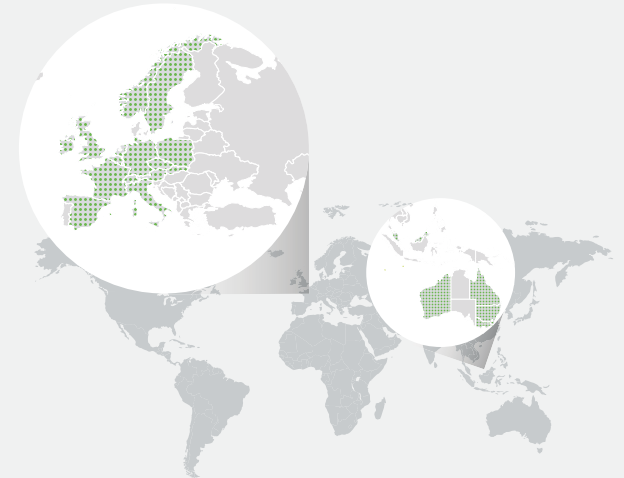
Germany, Netherlands, United Kingdom

### Network Access Products & Perimeter Protection

Australia, France, Germany, Ireland, Netherlands, Sweden, United Kingdom

### Architectural Products

Belgium, France, Germany, Netherlands, Poland, Slovakia



## Construction Accessories

CRH's Construction Accessories business is a leading global manufacturer and supplier of high-value innovative products and engineered solutions for challenging construction projects.

Construction Accessories products include a broad range of engineered anchoring, fixing and connection solutions as well as lifting systems, formwork accessories and general accessories for construction applications.

From our manufacturing footprint located mostly in Northern Europe, we export products across the world, targeting large-scale projects through project specification.

Construction Accessories products have been specified and used in many high-profile projects globally including skyscrapers, stadiums and infrastructure developments.

## Network Access Products & Perimeter Protection

The Network Access Products operation designs and manufactures technical systems for the access and protection of buried and above ground infrastructure, including composite access chambers and covers, and meter boxes. Due to the lightweight composite design, these products offer a time-saving alternative to traditional methods of construction.

Our Perimeter Protection business designs, manufactures, installs and services fully integrated outdoor security and detection solutions. This includes permanent and temporary fencing, entrance control and perimeter intrusion detection systems (PIDS).

## Architectural Products

CRH's landscaping businesses in Europe (formerly reported as part of Europe Heavyside) are now structured as a new Architectural Products platform within Europe Lightside.

The Architectural Products business is a leading producer of exterior hardscape products across six European countries. It produces pavers, kerbs, retaining walls and slabs for both private and public use. Products are sold to General Builders Merchants and Do-It-Yourself (DIY) outlets as well as to municipalities and large contractors.

## Shutters & Awnings

The Shutters & Awnings business designs, manufactures and supplies roller shutters, awnings, terrace roofs and related products for sun protection and outdoor living. Our companies offer energy-efficient products and solutions which contribute to a secure, sustainable and comfortable environment. Shutters & Awnings is well positioned to take advantage of a number of trends in the European building industry such as higher RMI spending, energy-efficiency, heightened security concerns, outdoor living and the emergence of "smart" homes.

\* EBITDA is defined as earnings before interest, taxes, depreciation, amortisation, asset impairment charges, profit on disposals and the Group's share of equity accounted investments' profit after tax.

\*\* Net Assets at 31 December 2017 comprise segment assets less segment liabilities as disclosed in note 1 to the Consolidated Financial Statements.

\*\*\* Products, sector exposure and end-use balance are based on sales.



## Operations Review - Europe Lightside

### Prior Year 2016

Results	Analysis of change					2016	% change
	2015	Exchange	Acquisitions	Divestments	Organic		
€ million							
Sales revenue	1,404	-32	+30	-50	+40	<b>1,392</b>	-1%
EBITDA (as defined)*	136	-4	+2	-3	+6	<b>137</b>	1%
Operating profit	90	-9	+2	-1	+10	<b>92</b>	2%
EBITDA (as defined)/sales	9.7%					<b>9.8%</b>	
Operating profit/sales	6.4%					<b>6.6%</b>	

During 2017, our dedicated European landscaping businesses previously included within our Europe Heavyside segment were reorganised to form a new platform, Architectural Products, within our Europe Lightside segment. Comparative segment amounts for 2016 and 2015 have been restated where necessary to reflect the new format for segmentation.

Although reported sales declined 1% driven by exchange and divestments, 2016 was a year of good underlying sales growth for Europe Lightside due to strong performances in key markets combined with some favourable weather patterns in the first-half of 2016. Our UK-based businesses continued to benefit from strong activity levels, with a robust residential construction sector in particular. In the Netherlands and France, recovery in construction activity was evident. Swiss market circumstances were challenging, while Germany and Belgium were ahead. Operating profit increased through a combination of growing demand, continuous product innovation, delivery on cost optimisation initiatives and margin expansion activities.

#### Construction Accessories

Like-for-like sales in the Construction Accessories platform grew by 5%, mainly resulting from a combination of continued innovation in key product lines and strong demand in some of our main markets, such as the UK and Germany. While competitive pressure in Switzerland intensified, activity levels in our other European markets and Australia picked up, resulting in strong organic growth across the platform. Our Southeast Asia business recorded a solid performance despite challenging trading conditions. Overall operating profit progressed well, reflecting a combination of organic sales growth and the positive impact arising from internal efficiency improvement initiatives undertaken in 2016.

#### Shutters & Awnings

The Shutters & Awnings business recorded flat like-for-like sales in 2016. The German Awnings business saw an increase in sales through a combination of benign weather patterns and the introduction of a number of new products to the market. The German Shutters business delivered a solid performance in relatively flat markets, increasing profitability as a result of the impact of continued performance optimisation measures. The UK business reported a stable organic performance, which was further aided by a complementary acquisition. Despite a decline in like-for-like sales, the Netherlands showed solid profit performance as margins increased in a competitive environment.

#### Network Access Products & Perimeter Protection

Network Access Products recorded an increase in both organic sales and operating profit through positive demand trends in the UK market in particular. Results were also supported by a positive contribution from its newly acquired UK-based business.

The permanent Perimeter Protection business saw a decline in sales, but still showed improvement in performance and continued progress following the restructuring of both its German and UK businesses. Our mobile fencing operation benefited from good demand particularly in its export business with a resultant increase in sales and profitability.

#### Architectural Products

Architectural Products sales progressed on 2015, however overall operating profit was behind. At our German business, sales were ahead of 2015 but operating profit was behind mainly as a result of product mix. Our Polish business experienced lower sales than 2015 whilst in Belgium and the Netherlands sales were ahead of 2015 reflecting improving economic conditions.

## Current Year 2017

Results	Analysis of change				2017	% change
	2016	Exchange	Acquisitions	Organic		
€ million						
Sales revenue	1,392	-15	+7	+56	<b>1,440</b>	3%
EBITDA (as defined)*	137	-2	+1	+7	<b>143</b>	4%
Operating profit	92	-2	+1	+11	<b>102</b>	11%
EBITDA (as defined)/sales	9.8%				<b>9.9%</b>	
Operating profit/sales	6.6%				<b>7.1%</b>	

Europe Lightside experienced a year of further growth as good performances in a number of key markets resulted in total sales for the Division finishing 3% ahead of 2016. Strong activity levels in the UK market underpinned demand, particularly for our Construction Accessories and Network Access Products businesses. Economic recovery continued in the Netherlands and Poland resulting in good growth, while activity in other key markets, including Belgium and Germany, was stable. Against this overall favourable market backdrop, a focus on continued cost optimisation and margin enhancement resulted in a 11% operating profit increase for the Division.

#### Construction Accessories

The year was one of progress for the Construction Accessories platform with strong organic sales due to robust activity levels across core markets and further product innovation. Operating profit also expanded, despite restructuring charges taken as part of the platform's optimisation of its production network. Our UK-based engineered accessories business experienced strong demand for its products, supported by good activity levels and both sales and operating profit were ahead of prior year. In Germany, the business also advanced, as positive trading conditions resulted in increased demand. For our Swiss business, reasonable activity levels saw sales finish ahead of prior year. Activities in the Netherlands and France benefited from ongoing economic recovery while sales in our Belgian business advanced in competitive markets. Our export markets proved challenging as project delays impacted performance, though our Australian business saw organic growth due to good demand for its products.

#### Shutters & Awnings

The Shutters & Awnings business recorded a 3% increase in sales compared with the prior year. The Netherlands, supported by underlying market activity and benefiting from operational improvements, reported a good trading performance. Our German businesses experienced challenges arising from tighter labour markets and increasing input costs; however, sales across the businesses advanced. The UK business reported a solid trading performance despite currency pressure. Operating profit for the platform remained in line with 2016.

#### Network Access Products & Perimeter Protection

The Network Access Products business, with operations in the UK, Ireland and Australia and a growing export base, had another year of growth in both sales and operating profit. Positive underlying infrastructure demand continued, particularly in its UK-based business; in addition, ongoing focus on optimising costs and product profile resulted in positive margin development for the business.

The permanent fencing business overall had a positive year as it reported both sales and operating profit ahead of prior year. Continued cost focus at our UK businesses resulted in improved sales and profitability and margins advanced in the Netherlands, despite competitive markets. The mobile fencing business, after a strong prior year, experienced another year of growth benefiting from improved building activity in its core markets.

#### Architectural Products

Despite a good demand backdrop across the platform's main markets and sales progression, operating profit finished behind last year as a result of a lower margin product profile in some markets. In the Benelux, trading advanced in an overall positive economic environment. For our German business, trading was broadly in line with last year while results were positively impacted by improved pricing and operational performance. In Poland, our operations experienced strong demand, albeit for some lower margin products, and with good volume growth sales finished ahead of the prior year.



# Europe Distribution

CRH's Europe Distribution Division, sells and distributes building materials to professional builders, specialist heating and plumbing contractors, and DIY customers through a network of trusted local and regional brands across a number of mature markets in Western Europe.

## What we do:

Europe Distribution is involved in the sale and supply of a wide range of building materials, catering to different local markets and varied customer groups.

Our development strategy is focused on increasing the network density of our existing businesses in our core markets, while also investing in new platforms and formats in other attractive segments of building materials distribution.

Substantial opportunities remain to improve our existing network in our core markets and to establish new propositions aimed at increasing our exposure to growing RMI market demand.

## How we create value:

We operate a portfolio of local brands that focus on building deep customer relationships through quality of our service, reliability and focused propositions aimed at selected market segments.

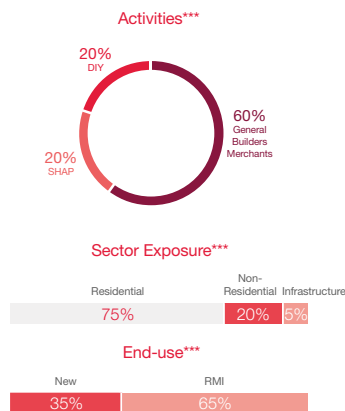
We innovate around the changing needs of our customers through the introduction of additional product categories, new formats and technology supporting our interaction with customers.

Collective expertise from across our various business segments is leveraged to optimise the supply chain, with just-in-time logistics, a category-management-based approach to procurement and focused IT systems.

## How we are structured:

The Division is active in three business areas: General Builders Merchants (GBM), Sanitary, Heating and Plumbing (SHAP), and DIY (Do-It-Yourself). The Division also holds a 21.13% equity interest in Samse S.A., a publicly-quoted distributor of building materials to the merchandising sector in the Rhône-Alpes region. Europe Distribution employs approximately 11,000 people at over 650 locations.

	€ million	% of Group
Sales	4,145	16%
Operating Profit	207	10%
EBITDA (as defined)*	269	9%
Net Assets**	1,615	8%



# Products and Services Locations

**General Builders Merchants**  
Austria, Belgium, France, Germany, Netherlands, Switzerland

**DIY**  
Belgium, Germany, Netherlands, Portugal (JV)

**SHAP**  
Belgium, Germany, Switzerland



## General Builders Merchants (GBM)

GBM distributes heavy building materials and a wide range of other products to professional customers, mainly small and medium sized builders from 352 locations. Europe Distribution has strong regional positions in GBM, based on a comprehensive branch coverage, wide product offering and high stock availability.

## Sanitary, Heating & Plumbing (SHAP)

SHAP businesses specialise in servicing the needs of plumbers and heating, gas, water, and ventilation technicians at 134 locations. The businesses are organised around public-facing showrooms to facilitate product choice, central warehousing and a wide network of pick-up locations for installers to collect or co-ordinate delivery.

## DIY (Do-It-Yourself)

Addressing the residential RMI segment, our DIY business sells decorative and home improvement products direct to the consumer from 198 easily-accessible retail locations. The DIY platform in Europe operates under four different brands: GAMMA (the Netherlands and Belgium), Karwei (the Netherlands), Hagebaumarkt (Germany) and our Maxmat joint venture (Portugal).

\* EBITDA is defined as earnings before interest, taxes, depreciation, amortisation, asset impairment charges, profit on disposals and the Group's share of equity accounted investments' profit after tax.

\*\* Net Assets at 31 December 2017 comprise segment assets less segment liabilities as disclosed in note 1 to the Consolidated Financial Statements.

\*\*\* Activities, sector exposure and end-use balance are based on sales.



## Operations Review - Europe Distribution

### Prior Year 2016

Results € million	Analysis of change					2016	% change
	2015	Exchange	Divestments	Swiss Fine	Organic		
Sales revenue	4,158	-24	-53	-	-15	<b>4,066</b>	<b>-2%</b>
EBITDA (as defined)*	171	-1	-2	+32	+6	<b>206</b>	<b>20%</b>
Operating profit	94	-1	-1	+32	+6	<b>130</b>	<b>38%</b>
EBITDA (as defined)/sales	4.1%					<b>5.1%</b>	
Operating profit/sales	2.3%					<b>3.2%</b>	

Europe Distribution was impacted in 2016 by mixed market circumstances in its main geographies, resulting in slightly reduced sales. However, performance improvement initiatives, strong cost control across the Division and the non-recurrence in 2016 of a one-off provision of €32 million in 2015 for a Swiss Competition Commission fine led to an increase in overall profitability. The Netherlands continued to show positive momentum in the new build residential market, while Belgium improved and Germany remained generally stable compared to 2015. The Swiss business faced a challenging market backdrop, with competitive pressures and the impact of new laws on second homes.

#### General Builders Merchants

Overall, like-for-like sales for our General Builders Merchants business declined in 2016 but operating profit remained stable. Challenging market circumstances in the Swiss business, where margin improvements and strong cost control could not fully compensate for lower sales levels, resulted in a decline in profitability. Trading in the Netherlands was strong as a result of increasing overall demand and delivery on performance improvement projects. Sales at our German business were stable, in line with market circumstances. Despite a recovering trend in the new residential market, performance in the French business was impacted by unfavourable weather patterns (including flooding) in the Paris area and a competitive market which resulted in a decline in sales and profitability compared to 2015. In Austria, improvements in pricing and product mix, as well as the closure of some branches led to improved results.

#### DIY (Do-It-Yourself)

Strong competitive pressures resulted in lower sales, but overall operating profit improved. In the Netherlands, DIY is more exposed to the late-cycle RMI market, therefore it did not benefit from an improving new residential market to the same extent as the builders merchants business. Although consumer confidence has improved, competition has also increased, in part due to new entrants. Despite lower sales levels, operating profit increased due to a range of performance improvement measures. The Belgian business suffered from reduced consumer confidence in 2016, leading to lower sales and operating profit. The German DIY business experienced flat sales and profitability, which was in line with market developments.

#### Sanitary, Heating and Plumbing (SHAP)

Sales for our SHAP business were flat compared to 2015, with good progress in Belgium and Germany offset by the challenging market backdrop in Switzerland. Significant cost reductions were realised in Switzerland, which partially compensated for the lower sales. Operating profit in the German and Belgian businesses improved, benefiting from higher sales levels in addition to operational improvements and procurement initiatives.

## Current Year 2017

Results € million	Analysis of change					2017	% change
	2016	Exchange	Acquisitions	Pension Credit	Organic		
Sales revenue	4,066	-20	+28	-	+71	<b>4,145</b>	<b>2%</b>
EBITDA (as defined)*	206	-1	-	+61	+3	<b>269</b>	<b>31%</b>
Operating profit	130	-1	-	+61	+17	<b>207</b>	<b>59%</b>
EBITDA (as defined)/sales	5.1%					<b>6.5%</b>	
Operating profit/sales	3.2%					<b>5.0%</b>	

Swiss pension plan past service credit of €61 million in 2017

The commentary below excludes the impact of a past service credit due to pension plan amendments in Switzerland.

Europe Distribution experienced stable sales and profit development but with mixed performances across our businesses. Overall sales were slightly ahead with a strong contribution from our General Builders Merchants business in the Netherlands which benefited from an increase in residential building volumes. In addition, our SHAP businesses in Germany and Belgium continued to gain market share in consolidating markets. These positive developments were partly offset by difficult market conditions in Switzerland.

#### General Builders Merchants

Our General Builders Merchants business showed 3% sales growth in 2017, with stable operating profit excluding depreciation. Continued increasing demand in the Netherlands combined with delivery on performance improvement projects resulted in further growth of the Dutch operating profit. Our German business showed sales growth against a flat RMI market backdrop, with profit impacted by acquisition-related costs. Market conditions in Switzerland remained challenging due to sluggish residential demand, and cost savings initiatives could not fully offset the impact of lower sales and increased pressure on trade margins. Our French business benefited from an improving residential sector and the performance in our Austrian business improved due to continued focus on our cost base.

#### DIY (Do-It-Yourself)

Our DIY business operates in the Netherlands, Belgium and Germany. Despite improving consumer confidence in these countries, competitive pressures and an increasing trend towards online sales contributed to declining store sales. Operating profit in our Netherlands business improved due to a continued focus on overhead costs and personnel productivity initiatives. Despite the opening of a new store in the Brussels area, sales and operating profit remained stable in a competitive environment. Our German DIY business performed in line with 2016, although trading was impacted by some unfavourable weather conditions at the beginning of the year.

#### Sanitary, Heating and Plumbing (SHAP)

Continued sales growth from additional pick-up locations and further investments in showrooms led to market share improvement in our German and Belgian SHAP businesses. Operating profit decreased due to declining results in Switzerland, which were partly offset by operational improvement, procurement initiatives and growth in Belgium and Germany.



# Americas Materials

CRH's Americas Materials Division is the leading vertically integrated supplier of aggregates, cement, asphalt, readymixed concrete and paving and construction services in North America.

## What we do:

CRH's Americas Materials Division is the number one producer of aggregates and asphalt and the second largest producer of readymixed concrete in North America.

CRH Americas Materials is a leading producer of cement in Canada. During 2017, it expanded its cement operations with the acquisition of assets in Florida. In Brazil, CRH is a major supplier of cement to the Rio de Janeiro and Belo Horizonte markets.

A significant portion of our business is awarded by public tender for federal, provincial, state and local government authority road and infrastructural projects. CRH Americas Materials also has a broad commercial customer base, supplying aggregates, cement, asphalt and readymixed concrete for industrial, office, shopping mall and private residential development and refurbishment. The Division is strongly resource-backed and broadly self-sufficient in aggregates with over 15 billion tonnes of reserves, of which approximately 80% are owned.

Our principal purchased raw materials are liquid asphalt and cement used in the manufacture of asphalt and readymixed concrete respectively.

## How we create value:

In a largely unconsolidated sector where the top ten aggregates, asphalt and readymixed concrete participants account for less than one third of overall production, our businesses build strong regional leadership positions in local markets underpinned by well-located, long-term reserves. Our deep market knowledge drives performance in local markets, while our extensive network allows us to leverage talent, synergies for procurement, cost management and operational excellence.

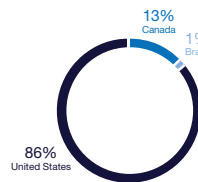
Americas Materials is vertically integrated in aggregates, asphalt, cement, readymixed concrete and paving and construction services. Approximately 30% of the aggregates we produce are sold internally, helping to drive company-wide growth and efficiency.

## How we are structured:

CRH Americas Materials is organised geographically into six divisions (North, South, Central, West, Canada and Brazil). The Division has a network of operations at close to 1,300 locations across 44 US states and six Canadian provinces, employing approximately 24,100 people.

	€ million	% of Group
Sales	7,970	32%
Operating Profit	858	41%
EBITDA (as defined) <sup>*</sup>	1,270	40%
Net Assets**	7,552	37%

### Geography\*\*\*



### Sector Exposure\*\*\*



### End-use\*\*\*



## Products and Services Locations

### Aggregates

Canada, United States

### Readymixed Concrete

Canada, United States

### Cement

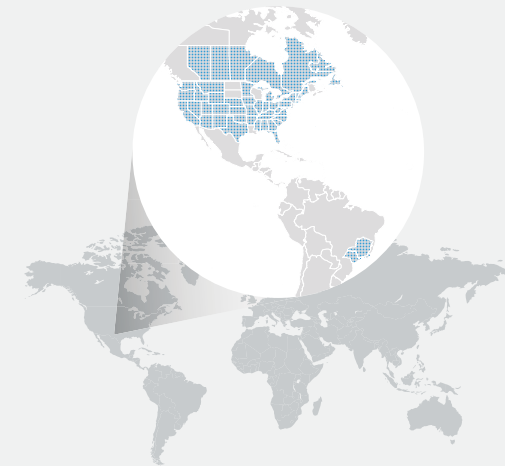
Brazil, Canada, United States

### Asphalt

Canada, United States

### Paving and Construction Services

Canada, United States



**Annualised Sales Volumes<sup>†</sup>:** Cement: 6.3m tonnes (6.8m tonnes<sup>††</sup>); Aggregates: 169.7m tonnes (170.6m tonnes<sup>††</sup>); Asphalt: 47.0m tonnes (48.5m tonnes<sup>††</sup>); Readymixed Concrete: 10.4m m<sup>3</sup> (10.7m m<sup>3</sup>)



## Aggregates

Aggregates, including sand, gravel and crushed stone, are essential ingredients in a wide range of construction materials. They can be found in everything from the asphalt pavements used to make roads, to the concrete used in bridges and foundations, to the sand traps in golf courses. With sales of 170 million annualised tonnes, Americas Materials is the number one producer of aggregates in North America.

## Cement

Cement is a primary building material and used as a binding agent in the production of a range of products for the construction industry. Americas Materials, a leading producer of cement in Canada, sold 3 million tonnes of cementitious product in 2017 and a further 2 million tonnes in Brazil. We also acquired a 1 million tonne cement plant in Florida to expand our cement operations in the US.

Because cement requires an energy-intensive manufacturing process, we have established a range of initiatives to reduce our carbon footprint and incorporate reusable, recyclable material.

## Asphalt

Asphalt is used in building roads, highways, runways and parking lots. Americas Materials is the number one asphalt producer in North America, selling 47 million annualised tonnes. We ensure value for our customers through quality control and rigorous product testing. We are committed to sustainability, with heavy investment in recycled materials and innovative warm-mix asphalt technologies that consume less fuel and release fewer emissions.

## Readymixed Concrete

Readymixed concrete is comprised of aggregates, cement and water. It is strong, customisable, versatile and durable, making it the world's most popular building material. Americas Materials sells approximately 10 million annualised cubic metres of readymixed concrete. Our readymixed concrete is produced to customer specifications and is delivered in a timely manner from our extensive network of locations.

## Paving and Construction Services

Americas Materials is the leading supplier of product for road construction and repair/maintenance demand in North America. Annually, our crews complete approximately €3.8 billion in paving and construction projects.

\* EBITDA is defined as earnings before interest, taxes, depreciation, amortisation, asset impairment charges, profit on disposals and the Group's share of equity accounted investments' profit after tax.

\*\* Net Assets at 31 December 2017 comprise segment assets less segment liabilities as disclosed in note 1 to the Consolidated Financial Statements.

\*\*\* Geography, sector exposure and end-use balance are based on sales.

† Throughout this document annualised volumes have been used which reflect the full-year impact of acquisitions made during the year and may vary from actual volumes sold.

†† Including the Group's share of equity accounted investments.



# Operations Review - Americas Materials

## Prior Year 2016

Results € million	2015	Analysis of change					2016	% change
		Exchange	Acquisitions	Divestments	LH Costs	Organic		
Sales revenue	7,018	-4	+715	-78	-	-53	<b>7,598</b>	<b>8%</b>
EBITDA (as defined)*	955	-	+72	-7	+50	+134	<b>1,204</b>	<b>26%</b>
Operating profit	620	-	+23	-3	+50	+128	<b>818</b>	<b>32%</b>
EBITDA (as defined)/sales	13.6%						<b>15.8%</b>	
Operating profit/sales	8.8%						<b>10.8%</b>	

LH integration costs of €7 million were incurred in 2016 (2015: €57 million)  
The LH integration costs refers to the businesses acquired from LafargeHolcim in 2015

With continued volume improvement, operational efficiencies and reduced energy costs, Americas Materials had another year of good profit growth in 2016 and delivered a strong organic operating profit. Residential and non-residential demand continued to improve, while publicly funded infrastructure activity remained stable resulting in an overall improvement in trading conditions in the US. Organic sales were down 1% but like-for-like operating profit increased 21%, with positive real price improvements experienced across all products. 2016 also represented the first full year of results from the LH Assets acquired in 2015, which saw mixed regional results from Canada alongside more challenging market conditions in Brazil.

Total volumes, including acquisition effects, increased 9% for aggregates, 3% for asphalt and 22% for readymixed concrete. This volume growth, together with a 3% average price increase in aggregates, a 4% average price increase in readymixed concrete in the US and efficient cost control resulted in margin improvements in 2016. Despite price declines of 8% in asphalt, strong leverage on increased volumes and the beneficial impact of lower energy prices contributed to margin expansion. Construction sales increased 6%, driven by the Canadian business as bidding continued to be competitive in the US despite limited increased infrastructure spending across some states. Good cost control enabled margin expansion. Demand in our North American cement markets increased as declines in Western Canada were more than offset by increases in Quebec and the US market. Average prices were steady despite strong external downward pricing pressures in the Canadian regions.

While the main focus in 2016 was on successfully integrating our Canadian and Brazilian acquired assets, eight bolt-on acquisitions and one investment were also completed in 2016 at a total

cost of €112 million. The principal acquisition was of a significant aggregates and asphalt operation in Utah which added three asphalt plants, one readymixed concrete plant and lease rights to 16 aggregates sites. In total 93 million tonnes of permitted reserves were added in 2016. Business and asset disposals in 2016 generated proceeds of €107 million, continuing the optimisation of our strategic footprint.

### United States

Like-for-like aggregates volumes rose 4% from 2015 while average prices increased by 3%. Asphalt volumes increased 1% on a like-for-like basis while input cost decreases more than offset like-for-like price declines of 8% compared to 2015. US readymixed concrete volumes increased 4% compared with 2015 and average prices increased 4%. Like-for-like sales in our paving and construction services business decreased 3%, but this was offset by overall margin expansion of 140 basis points in 2016. Performance was positively impacted by the lower energy cost environment experienced throughout 2016.

Operations in the US were reorganised at the beginning of 2016 into four divisions; North, South, Central and West. The North division's sales were down from 2015; however, with the benefit of operating efficiencies, strong cost controls and lower energy costs, operating profit in the division improved significantly in 2016. Heritage sales in the South division were 1% ahead in 2016, despite record flooding in West Virginia and Kentucky, and the impact of hurricane Matthew. Operating profit was also well ahead in the division with increased volumes contributing to margin growth. With resilient market growth in Texas in both the public and private sectors, the Central division delivered a heritage sales increase of 8% along with strong margin improvement. Like-for-like volumes in the division were ahead

of 2015, with Texas in particular showing strong growth. With strong operating and overhead cost management across each product line, the West division reported heritage sales 2% ahead of 2015 along with margin and operating profit increases.

### Canada

Sales and operating profit were ahead of 2015 with the impact of a full year of ownership of the LH Assets in 2016 augmented by a series of major projects including the Highway 407 extension in Ontario and the Turcot Highway Interchange in Montreal as well as strong backlogs. There were mixed results across different product lines and regions, with improvements in our core markets of Ontario and Quebec partially offset by margin pressures and weaker demand in our Western Canada businesses.

### Brazil

The construction market weakened in 2016 as a result of deteriorating macroeconomic and political conditions, with overall cement consumption down 12% in the Southeast region and selling prices under continued pressure in a very competitive environment.

## Current Year 2017

Results € million	2016	Analysis of change					2017	% change
		Exchange	Acquisitions	Divestments	LH Costs	Organic		
Sales revenue	7,598	-123	+379	-80	-	+196	<b>7,970</b>	<b>5%</b>
EBITDA (as defined)*	1,204	-24	+46	-5	+7	+42	<b>1,270</b>	<b>5%</b>
Operating profit	818	-19	+12	-2	+7	+42	<b>858</b>	<b>5%</b>
EBITDA (as defined)/sales	15.8%						<b>15.9%</b>	
Operating profit/sales	10.8%						<b>10.8%</b>	

The LH integration costs refers to the businesses acquired from LafargeHolcim in 2015

2017 was a year of progress in Americas Materials, supported by continued economic growth across residential and non-residential sectors, while infrastructure remained stable in our markets. Despite record levels of rainfall during the year and hurricane activity experienced in Florida and Texas, both sales and operating profit increased 5%, as selling price increases were achieved across all products in North America.

Aggregates had a strong finish to 2017 and together with the positive impact of acquisitions during the year, total volumes were 7% ahead, while like-for-like volumes were flat. Average price increases of 6% on a like-for-like basis combined with efficient cost control resulted in margin expansion.

Margin improvement was also experienced in our readymixed concrete operations as like-for-like volumes increased 4% while overall volumes were 3% ahead, impacted by 2016 divestments in our Central division. Both like-for-like and total average prices increased by 3%.

Although like-for-like asphalt volumes increased 2% and 6% on an overall basis, asphalt margins were under pressure with like-for-like average price increases unable to offset higher input costs.

With pockets of increased state infrastructure spending, like-for-like sales for paving and construction services increased 1% with overall sales 7% ahead. Construction margin improved slightly in 2017, despite the ongoing competitive bidding environment.

Our cement business in North America saw total volumes 3% ahead and marginal price increases, supported by stronger demand in the US. Against the backdrop of a favourable US price environment, Americas Materials continued to optimise its terminal network and market penetration by repositioning more volumes to the US from Canada, where competitive market conditions remain, especially in Quebec.

Americas Materials continued to strengthen its position in existing and complementary markets throughout North America in 2017 and completed 13 acquisitions for a combined total of €1.1 billion. The principal acquisition, which was completed at the end of November 2017 and therefore had a limited contribution to current year trading, was Suwannee American Cement together with certain other materials assets; consisting of a 1 million tonne cement plant in Florida, 18 readymixed concrete plants, an aggregates quarry, two block plants and nine gunit facilities.

### United States

Trading benefited from solid demand in the US and, despite some unfavourable weather, total volumes and prices increased across all products. Like-for-like sales saw a resulting 4% increase in 2017. Operating profit also increased though margin expansion in aggregates and readymixed concrete was partly offset by a decline in asphalt margins due to higher bitumen prices, a key component of asphalt mix.

Our US operations are divided into four main divisions: North, South, Central and West. The North division comprises operations in 13 states, with key operations in Ohio, New York, New Jersey and Michigan. With significant precipitation as well as softer markets in Michigan and Connecticut, volumes were down across all products, although increased pricing and improved construction sales resulted in a like-for-like sales increase. Operating profit was further impacted by increased input costs, and margin declined. The South division comprises operations in 12 states with key operations in Florida, North Carolina and West Virginia. Like-for-like South division sales and operating profit were ahead 7% and 14% respectively, despite the impact of hurricane Irma which caused downtime at several locations in Florida and Georgia. Improvements were mainly driven by increased construction activity and margin, as well as price increases across all products.

The Central division has operations in nine states, with the key states being Texas, Arkansas and Minnesota. Like-for-like Central division sales were down 3% mainly due to unfavourable weather during the summer which continued into autumn, along with the impact of hurricane Harvey; however, with strong cost control and the benefit of operating efficiencies, overall operating profit improved over prior year. The West division has operations in ten states, the most important of which are Utah, Idaho, Washington and Colorado. Overall demand was strong across the division, with improved volumes across all product lines resulting in like-for-like sales up 11% compared with the prior year. Operating profit was also well ahead in the division, with aggregates and readymixed concrete price increases taking hold and driving increased margin.

### Canada

The overall Canadian economy expanded in 2017, led by robust gains in the core markets of Ontario, Quebec and Alberta. The pace of growth was largely fuelled by improvements in oil prices and continued spending by Canadian consumers. Despite the positive environment and increases of volumes across all products, like-for-like sales were muted by regional variations in pricing and the performance within the construction business, which was impacted by adverse weather conditions and the non-recurrence of key projects.

### Brazil

Weakness in the construction market continued during 2017 due to the unfavourable economic and political situation; however, more recently, lower interest rates and a reduction in inflation have started to have a positive impact. While cement consumption was down 5% in the Southeast region, CRH saw volume improvements through a focus on key customer segments; however, selling prices continued to fall below 2016 levels.



# Americas Products

CRH's Americas Products Division is one of North America's leading suppliers of construction products. Its businesses manufacture, supply and deliver the products needed to shape and enhance the built environment for modern communities.

## What we do:

CRH Americas Products is a leading supplier of value-added building products, primarily to residential, and non-residential construction projects across the US and Canada. Our broad product range and extensive geographic footprint allow us to serve large national customers as well as providing smaller customers with the personal touch of a local supplier. Our architectural, precast concrete and building envelope products businesses serve the needs of local customers mainly in the residential and non-residential building sectors.

## How we create value:

As part of our ongoing focus on value creation we consistently invest in talent development, commercial and operational excellence processes, innovation and technology to ensure continuous improvement in everything we do. Our commitment to building better businesses is demonstrated in our approach at national and regional levels to facilitate best practice sharing. We leverage our unique scale, breadth and capabilities to build competitive advantage in key segments and channels. We maintain a

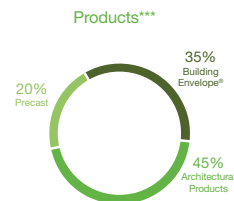
pipeline of innovative and value-added products and design-solutions through our research and development centres.

Americas Products' development strategy is to build a portfolio of networked and scalable businesses with leading market positions across a balanced range of products and end-use markets. Focusing strategic accounts and influencers in the construction supply chain on CRH's broader product and capability portfolio, our Building Solutions group provides an additional avenue for market share growth.

## How we are structured:

Americas Products is organised into three strategic product groups, Architectural Products, Precast and BuildingEnvelope® which maintain distinct organisations for their business-specific strategies, with the centre supporting finance, talent management, business development and strategy, strategic account development and procurement. Each group has smaller national or regional positions in product lines that support and complement its core businesses. The Division employs approximately 17,100 people at nearly 350 locations.

	€ million	% of Group
Sales	4,327	17%
Operating Profit	435	21%
EBITDA (as defined)*	573	18%
Net Assets**	3,122	15%



## Products and Services Locations

**Glass Fabrication and Glazing Systems**  
Canada, United States

**Construction Accessories**  
United States

**Architectural Concrete and Related Products**  
Canada, United States

**Precast Concrete, Pipe and Related Products**  
Canada, United States

**Custom Glazing Hardware and Installation Products**  
Australia, Canada, Denmark, Germany, United Kingdom, United States

**Annualised Sales Volumes†:** Concrete masonry, patio products & pavers: 8.2m tonnes; Pre-packaged concrete mixes: 4.2m tonnes; Pre-packaged lawn & garden products: 6.5m tonnes; Precast concrete products: 1.8m tonnes; Building envelope products: 7.2m m², 67,000 SKUs



## Architectural Products

The Architectural Products Group (APG) is North America's leading supplier of concrete masonry, hardscape and related products for residential, commercial and DIY (Do-It-Yourself) construction markets. APG has 182 operating locations in 36 states and five Canadian provinces.

Competition for APG arises primarily from other locally owned building products companies. Principal raw material supplies are readily available.

APG's concrete masonry products are used for veneers, walls and foundations. Hardscape products comprise pavers, retaining wall and patio products.

Dry cement mixes, marketed under brands such as Sakrete® and Amerimix®, are also an important product offering of our business.

Lawn & garden products, mainly bagged and bulk mulch, soil and speciality stone products, are marketed to major DIY and homecenter chains across the US. Composite decking products, marketed under the ChoiceDek™ and MoistureShield™ brands, are another key outdoor living offering in our portfolio.

## Precast

Our Precast group is one of North America's leading manufacturers of precast concrete and related products with 77 locations across North America predominantly in 26 US states. The group employs approximately 4,100 employees.

Precast manufactures a range of concrete and polymer-based products such as underground vaults, drainage pipe and structures, utility enclosures and modular precast structures which are supplied to the water, electrical, telephone and railroad markets and to select non-residential building applications.

The Precast group also includes the construction accessories business, which supplies specialised products used in concrete construction activities. In many instances, precast products are an alternative to poured-in-place concrete, which is a significant competing product.

## BuildingEnvelope®

Our Oldcastle BuildingEnvelope® (OBE) business is a leading integrated supplier of products specified to close the building envelope, including architectural glass, storefront systems, custom engineered curtain wall and window wall, architectural windows, doors and skylights. OBE is also the largest supplier of architectural railings, glazing hardware and high performance glass installation products in North America.

Our products are specified across all market segments from single-storey storefronts to intermediate multi-storey commercial structures to high-rise, monumental buildings. OBE employs approximately 6,700 people and serves every major North American metropolitan and regional market through its 82 operating locations along with further operating locations across Europe (4) and Australia (3).

\* EBITDA is defined as earnings before interest, taxes, depreciation, amortisation, asset impairment charges, profit on disposals and the Group's share of equity accounted investments' profit after tax.

\*\* Net Assets at 31 December 2017 comprise segment assets less segment liabilities as disclosed in note 1 to the Consolidated Financial Statements.

\*\*\* Products, sector exposure and end-use balance are based on sales.

† Throughout this document annualised volumes have been used which reflect the full-year impact of acquisitions made during the year and may vary from actual volumes sold.



# Operations Review - Americas Products

## Prior Year 2016

Results € million	Analysis of change					2016	% change
	2015	Exchange	Acquisitions	Divestments	Organic		
Sales revenue	3,862	-48	+390	-214	+290	<b>4,280</b>	11%
EBITDA (as defined)*	391	-3	+80	-6	+81	<b>543</b>	39%
Operating profit	249	+2	+58	-1	+103	<b>411</b>	65%
EBITDA (as defined)/sales	10.1%					<b>12.7%</b>	
Operating profit/sales	6.4%					<b>9.6%</b>	

Our Products business in the Americas is mainly located in the US and Canada. 2016 saw good progress especially in the first-half, helped by an ongoing pick-up in US macroeconomic fundamentals, including stronger labour markets and good consumer sentiment, which have strengthened private new residential construction and RMI. There was good growth in the South, East Coast and West Coast markets due to an improving non-residential construction sector.

Input cost inflation was more than offset by the effects of improved operational efficiencies, procurement initiatives, favourable product mix and targeted price increases. Benefiting from strong acquisition trading results and synergies from the CRL acquisition, as well as good organic growth across the Division, Americas Products achieved a 65% increase in operating profit and margins improved.

The acquisition of Techniseal, a manufacturer of packaged products for hardscapes installation, added a product capability complementary to APG's core hardscape business. In addition, four other small bolt-on acquisitions were completed and APG divested its non-core Gemseal business, a manufacturer and supplier of pavement maintenance products, along with two other smaller divestments.

### Architectural Products

With the benefit of favourable weather early in 2016, APG showed increased activity in the RMI sector, with continued improvement from residential and commercial construction. Sales volumes were strong across the US but were more steady in Canada. The favourable selling environment, together with product innovation and commercial initiatives, drove gains across all major product categories and channels resulting in an increase in like-for-like sales compared with 2015. APG focused on both product portfolio management and cost reduction efforts to maximise returns. Overall, APG recorded a strong improvement in operating profit for 2016.

### BuildingEnvelope®

In 2016, non-residential building activity experienced increases in both institutional and commercial markets, though contract square footage decreased slightly. Sales growth was driven by favourable glass pricing and product mix, and enhanced production capabilities in architectural glass. These, coupled with actions to differentiate the business through innovative products and technology, enabled OBE to achieve substantial growth in margins and operating profit.

Integration of the CRL and OBE businesses has been very successful and both CRL and OBE have continued to benefit from significant synergies through an increased common customer base and fixed cost efficiencies. With a full year of ownership, CRL had strong sales and profit growth and showed an improvement in margins in 2016.

### Precast

In 2016, strong sales growth was achieved as specific commercial initiatives continued to deliver, along with improved demand for both private construction and public infrastructure. Operating profit increases were achieved in most markets across all concrete product lines with a particularly strong performance in the West. Overall, like-for-like sales increased, operating profit advanced significantly and backlogs remained strong.

## Current Year 2017

Results € million	Analysis of change					2017	% change
	2016	Exchange	Acquisitions	Divestments	Organic		
Sales revenue	4,280	-79	+87	-14	+53	<b>4,327</b>	1%
EBITDA (as defined)*	543	-10	+10	+1	+29	<b>573</b>	6%
Operating profit	411	-8	+4	+2	+26	<b>435</b>	6%
EBITDA (as defined)/sales	12.7%					<b>13.2%</b>	
Operating profit/sales	9.6%					<b>10.1%</b>	

Continued improvement in macroeconomic conditions positively impacted construction; however, activity was limited by historically high levels of precipitation in 2017, supply-side factors such as the shortage of skilled construction labour and competitive markets. Americas Products saw good growth along the West Coast and parts of the South and Southeast due to improving residential and non-residential construction, partly offset by more modest trading in Canada and parts of the Northern US. Contributions from improved operational efficiencies, improved product and project mix, procurement initiatives and targeted price increases more than offset the impact of input cost inflation. Benefiting from the contribution of acquisitions and continued synergies from the CRL acquisition, Americas Products achieved a 6% increase in operating profit and margins improved.

Americas Products completed eight acquisitions and one joint venture investment for total consideration of €0.2 billion. The acquisition of Advanced Environmental Recycling Technologies, Inc. (AERT), a manufacturer of composite decking, added an outdoor living product complementary to APG's Belgard hardscapes and retaining wall products. Also, the acquisition of Block USA extended APG's masonry footprint into Alabama, Mississippi and the Gulf Coast.

### Architectural Products

With the benefit of acquisitions, APG saw increased activity, especially in the residential RMI sector. Growth was at a more measured pace than last year, with volumes affected by unfavourable weather and installation labour shortages. Activity was good across most of the US but more moderate in Canada. Solid demand from major products and distribution channels, together with product innovation and commercial initiatives, drove a modest increase in like-for-like sales compared with 2016. APG continued to focus on operating cost reduction efforts to maximise returns. Overall, APG saw good operating profit growth for the year.

### BuildingEnvelope®

In 2017, non-residential building activity saw continued advancement but at a slower pace than prior years. OBE experienced relatively flat sales revenue in 2017 because of more challenging market conditions, more selective bidding on larger projects and tighter skilled labour markets. However, OBE recorded improved operating profits because of better sales mix, improved operational performance and continued synergies from the integration of the CRL and OBE businesses.

### Precast

Sales growth was achieved in 2017 but was limited by unfavourable weather and relatively slower demand growth for both private construction and public infrastructure in certain markets. Precast recorded increased operating profits, due to better operational performance at construction project businesses, partly offset by margin impacts from increased input costs. In addition, backlogs remained strong in 2017.





## Asia

CRH's Asia Division is comprised of cement operations in the Philippines, Northeast China and Southern India. These positions represent strategic growth platforms which provide us with exposure to industrialisation, urbanisation and population related construction demand in the region's developing economies.

### What we do:

CRH is the second largest producer of cement in the Philippines. The Group also has strategic footholds in regional cement markets in China and India. The Group is committed to investing in, and developing its leadership positions in the region.

CRH's Asia Division is focused on maximising performance and returns in its businesses, expanding its balanced portfolio of diverse products and geographies and conducting its businesses responsibly and sustainably.

### How we create value:

CRH Asia creates value by identifying and establishing select positions with strong long-term prospects in regional markets.

Using CRH's proven acquisition model, we are focused on building on our existing platforms and on making our businesses better. Since

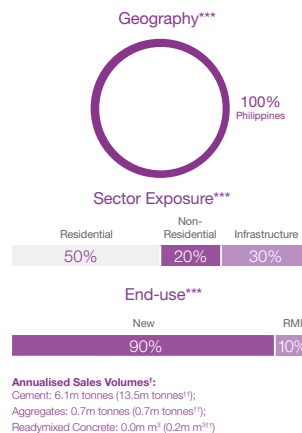
our initial entry into the Chinese and Indian markets, we have increased capacity more than threefold through both organic growth and the successful integration of new bolt-on acquisitions. Our joint venture in India recently commissioned its new grinding unit at Tuticorin in the southern state of Tamil Nadu, which gives us access to new markets.

CRH Asia achieves benefits of scale and other synergies in areas such as Health & Safety, operational efficiency, commercial excellence, energy-efficiency and procurement.

### How we are structured:

In the Philippines our operations span 12 different operating locations. Our country level head-offices in China and India report to CRH's regional headquarters in Singapore. The Division employs approximately 1,400 people, with a further 7,500 in our equity accounted investments.

	€ million	% of Group
Sales	436	2%
Operating Profit	15	1%
EBITDA (as defined)*	52	2%
Net Assets**	1,230	6%



### Aggregates

In the Philippines, CRH's operations include the production and supply of aggregates used in concrete for housing, buildings and infrastructure.

### Cement

Republic Cement, the second largest cement producer in the Philippines has six strategically located cement production facilities across the country which contribute to a total capacity of 7.5 million tonnes.

CRH's operations in China consist of a 26% stake in Yatai Building Materials, a market leader in cement in Northeast China, with a cement capacity of 32 million tonnes

and operations in the three provinces of Heilongjiang, Jilin and Liaoning.

My Home Industries Limited (MHIL) is our 50% joint venture cement producer in Southern India. It has a leading position in the states of Andhra Pradesh and Telangana, with a total capacity of 9.6 million tonnes across four locations.

## Operations Review - Asia

### Current Year 2017

Results	€ million	Analysis of change			2017	% change	
		2016	Exchange	LH Costs			Organic
Sales revenue	508		-39	-	-33	436	-14%
EBITDA (as defined)*	109		-11	+6	-52	52	-52%
Operating profit	71		-7	+6	-55	15	-79%
EBITDA (as defined)*/sales	21.5%					11.9%	
Operating profit/sales	14.0%					3.4%	

The LH integration costs refers to the businesses acquired from LafargeHolcim in 2015

The Asia Division was formed following the acquisition of the Philippines operations as part of the LH Assets transaction in 2015. The table above includes the results from these operations together with CRH Asia's divisional costs.

In addition to our subsidiary businesses in the Philippines, the Group also has a share of profit after tax from our stakes in Yatai Building Materials in China and MHIL in India, which are reported within the Group's equity accounted investments as part of profit before tax.

### Philippines

While economic growth and market fundamentals remain robust, with both residential and non-residential demand stable, major infrastructure projects progressed at a slower pace in 2017. Despite this, the long-term outlook for the construction industry in the Philippines remains strong.

Although volumes increased in 2017, driven by a strong performance in the Visayas and Mindanao (VisMin) housing sector, overall sales were behind, as prices were impacted by additional capacities in the market and aggressive competitor pricing. The impact of lower selling prices combined with increased fuel and power costs resulted in lower operating profit than 2016.

### Equity Accounted Investments

#### China

Despite volumes being under pressure in Northeast China, prices significantly recovered in the market, with both cement and clinker prices in Yatai Building Materials well ahead of 2016. The higher prices more than offset increased coal prices and resulted in improved performance in 2017.

#### India

Despite recording higher cement volumes and marginally higher prices, MHIL ended 2017 with operating profit behind prior year due to increased fuel prices, as well as lower sales of power to third parties.

### Prior Year 2016

Results	€ million	Analysis of change				2016	% change	
		2015	Exchange	Acquisitions	LH Costs			Organic
Sales revenue	151		-6	+360	-	+3	508	236%
EBITDA (as defined)*	2		-	+93	+13	+1	109	n/m
Operating profit/(loss)	-7		-	+71	+13	-6	71	n/m
EBITDA (as defined)*/sales	1.3%						21.5%	
Operating profit/sales	-4.6%						14.0%	

LH integration costs of €6 million were incurred in 2016 (2015: €19 million)  
 n/m not meaningful percentage movements

The LH integration costs refers to the businesses acquired from LafargeHolcim in 2015

### Philippines

The construction market remained strong in the Philippines in 2016, with growth in cement demand largely due to increased construction activities in the private sector and government infrastructure spending. Despite competitive markets, operating profit was ahead due to higher selling prices and lower variable costs which benefited from a decrease in the price of imported clinker and lower prices of fuel and power.

### Equity Accounted Investments

#### China

Yatai Building Materials continued to be affected by lower volumes and selling prices. Cement prices were down 3% due to lower levels of construction activities and overcapacity in the market.

#### India

Sales at MHIL decreased by 8% due to lower cement prices, increased competition and new capacities in the region. This coupled with lower clinker exports was only partly offset by improved cement volumes, and operating profit was lower in 2016.

\* EBITDA is defined as earnings before interest, taxes, depreciation, amortisation, asset impairment charges, profit on disposals and the Group's share of equity accounted investments' profit after tax.

\*\* Net Assets at 31 December 2017 comprise segment assets less segment liabilities as disclosed in note 1 to the Consolidated Financial Statements.

\*\*\* Geography, sector exposure and end-use balance are based on sales.

† Throughout this document annualised volumes have been used which reflect the full-year impact of acquisitions made during the year and may vary from actual volumes sold.

‡ Including the Group's share of equity accounted investments.



## Americas Distribution (Discontinued Operations)

Americas Distribution was a leading distributor of roofing, siding, drywall, ceiling systems and related accessories to speciality contractors in residential and commercial construction in the United States.

In August 2017, the Group entered into a sales agreement to divest of its 100% holding in Allied Building Products, the trading name of our Americas Distribution Division. The transaction closed on 2 January 2018. In accordance with IFRS 5, the Division is reported as discontinued operations for 2017 (see note 2 to the Consolidated Financial Statements). The business description and trading performance that follows is provided for information purposes only.

Americas Distribution, was a leading supplier to speciality contractors of Exterior Products (roofing and siding), and Interior Products (ceilings and walls), as well as Solar Roofing panels, primarily for the residential market.

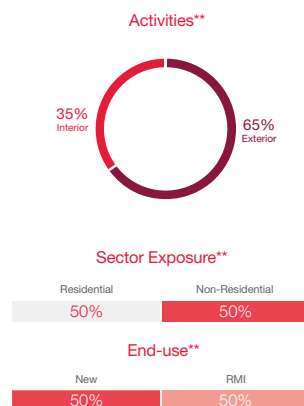
The business, which was characterised by a strong commitment to both customers and manufacturers, was cyclical in nature and sensitive to changes in general economic conditions, specifically to fluctuations in housing and construction-based markets.

Americas Distribution deployed state-of-the-art customer-facing IT technologies, disciplined and focused cash and asset management systems, and well established procurement and commercial systems to support supply chain optimisation and enabled it to provide superior customer service.

The Division established the private label Tri-Built Materials Brand to help differentiate from competitors in the marketplace, establish a unique brand identity and expand margins. This initiative grew to include more than 30 residential and commercial accessory products.

Americas Distribution was structured as two divisions: Exterior Products and Interior Products and operated in 31 states across over 200 locations, employing approximately 3,900 people.

	2017	2016	2015
	€ million		
Sales	2,343	2,315	2,229
Operating Profit	143	119	111
EBITDA (as defined)*	164	150	140



### Exterior Products

Exterior Products distributed both commercial and residential roofing, siding and related products. Additionally, two locations were dedicated to the distribution of Solar Roofing panels. Demand in the Exterior Products business was largely influenced by residential and commercial replacement activity with key products

having an average lifespan of 25 to 30 years. Commercial roofing products included single-ply membranes and various asphalt-based roll roofing products along with complementary products, such as sealants, vapour barriers and roof cements and coatings.

### Interior Products

Interior Products distributed gypsum wallboard, metal studs and acoustical tile and grid. Demand for Interior Products was primarily driven by the new residential, multi-family and commercial construction markets. Interior Products' customers consisted of interior partition and commercial ceiling contractors. Sales trended slightly toward commercial construction and were predominantly focused on new construction for both residential and commercial-based projects.

## Operations Review - Americas Distribution (Discontinued Operations)

### Current Year 2017

Solid revenue and strong operating profit growth was achieved in 2017, predominantly in the Exterior Products division. Sales in the Interior Products business, while remaining healthy, finished the year behind prior year levels.

Demand for Exterior Products, specifically residential roofing, was very strong in the hail-affected markets of Minnesota, Colorado, Maryland, Virginia and Chicago. Continued economic improvement and focused growth in the Northeast markets (New York, New Jersey, Pennsylvania), Michigan and Florida were additional performance drivers for the Exterior Products division. Following a very robust 2016 multi-family demand in the Hawaiian Interior Products market, 2017 sales volumes

returned to a more normalised level. This was partly offset by gains in the California and Colorado Interior Products markets. Recent facility investments in the Solar business fuelled growth in that segment also.

In 2017, management remained highly focused on cost control and maintaining gross margin through improved procurement initiatives and the persistent monitoring of non-essential expenses. Business process improvements and the regional service area model continued to mature, enabling further economies of scale. Five new greenfield locations were opened in 2017 and the Tri-Built private label business continued to be developed.

### Exterior Products

Most of the residential roofing products continued to grow in 2017, both in line with the market and due to concentrated efforts to improve the residential product mix. The storm-affected areas experienced significant roofing growth and overall the Exterior Products division reported solid sales and improved operating profits in 2017.

### Interior Products

Sales in this division were tempered in most markets compared with prior year, with the largest slowdown in the Hawaiian market coming off a very robust 2016. A focused approach to cost control and gross margin improvement enabled operating profits to remain in line with prior year.

### Prior Year 2016

2016 was a year of solid profit delivery on increased sales and both the Exterior Products and Interior Products divisions advanced and recorded sales and profit growth.

Strong demand in the Florida, Chicago and Atlantic markets, focused growth in Iowa, Ohio and Michigan markets and storm driven demand in Texas were the drivers of performance in the Exterior Products division. Against a strong performance in 2015, sales in Northeast markets were marginally behind 2015.

The Interior Products division continued to experience volume growth throughout 2016. The strongest gains were in Western markets, particularly California and Hawaii where increased demand continued to be driven by robust multi-family construction, offsetting softer Carolinas markets.

In 2016, management remained highly focused on gross margins in a very competitive environment through improved procurement initiatives. Margin discipline and optimised working capital were maintained while growing organically. Technology investments made

in 2016 included a customer relationship management tracking system and a highly functional mobile application for customers, all of which served to differentiate in the marketplace. The regional service area model continued to mature, and the drive towards simplifying business processes through continuous improvement all added to the potential for greater economies of scale as the business expanded.

Although no acquisitions were completed in 2016, the opening of five new locations continued to strengthen the greenfield and service centre strategy. This continued focus allowed improvement in the area of customer service, cost control and more efficiently leveraging existing assets. Sales and product offerings of the Tri-Built private label brand continued to grow in 2016. This, combined with investments in technology and the ongoing effort and expansion of the service centre network, continued to differentiate the business in the marketplace.

### Exterior Products

Commercial roofing continued to experience modest industry-wide growth while growth in the residential sector was largely due to the high level of hail storm activity experienced in specific markets in the US, particularly in Texas. While most of Exterior Products residential roofing markets grew in line with the market, concentrated efforts resulted in an improved residential product mix. The Exterior Products division reported solid sales and improved operating profits in 2016.

### Interior Products

Performance in this business was strong in most markets with increased demand of core products contributing to higher sales and operating profit. The strong growth of multi-family construction and a shift towards more urbanisation led to particularly strong results in the Southeast and West Coast markets. Focused investments in new locations and operational excellence initiatives helped to achieve solid sales growth and higher operating margins.

\* EBITDA is defined as earnings before interest, taxes, depreciation, amortisation, asset impairment charges, profit on disposals and the Group's share of equity accounted investments' profit after tax.

\*\* Activities, sector exposure and end-use balance are based on 2017 sales.



Governance

Governance



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Every year Tarmac, part of CRH's Europe Heavyside Division, moves approximately nine million tonnes of material by rail freight. In 2017 Tarmac opened a new rail depot at Garston, Liverpool, as part of its strategy to increase the movement of material by rail. The new depot will take around 10,000 trucks off British roads every year.



## Board of Directors

### Nicky Hartery

**Non-executive Chairman**

**Appointed to the Board:** June 2004

**Nationality:** Irish

**Age:** 66

**Committee membership:** Acquisitions Committee; Finance Committee; Nomination & Corporate Governance Committee

**Skills and experience:** Nicky was Vice President of Manufacturing and Business Operations for Dell Inc.'s Europe, Middle East and Africa (EMEA) operations from 2000 to 2008. Prior to joining Dell, he was Executive Vice President at Eastman Kodak and previously held the position of President and Chief Executive Officer at Verbatim Corporation, based in the US.

**Qualifications:** C.Eng, FIEI, MBA.

**External appointments:** **Listed:** Non-executive Director of Finning International, Inc., the world's largest Caterpillar equipment dealer. **Non-listed:** Chief Executive of Prodigium, a consulting company which provides business advisory services; non-executive Chairman of Musgrave Group plc, a privately-owned international food retailer.



### Albert Manifold

**Chief Executive**

**Appointed to the Board:** January 2009

**Nationality:** Irish

**Age:** 55

**Committee membership:** Acquisitions Committee

**Skills and experience:** Albert was appointed a CRH Board Director in January 2009. He joined CRH in 1998. Prior to joining CRH, he was Chief Operating Officer with a private equity group. While at CRH, he has held a variety of senior positions, including Finance Director of the Europe Materials Division (now Europe Heavyside), Group Development Director and Managing Director of Europe Materials. He became Chief Operating Officer in January 2009 and was appointed Group Chief Executive with effect from 1 January 2014.

**Qualifications:** FCPA, MBA, MBS.

**External appointments:** **Listed:** Not applicable. **Non-listed:** Not applicable.



### Senan Murphy

**Finance Director**

**Appointed to the Board:** January 2016

**Nationality:** Irish

**Age:** 49

**Committee membership:** Acquisitions Committee; Finance Committee

**Skills and experience:** Senan has over 25 years' experience in international business across financial services, banking and renewable energy. He joined CRH from Bank of Ireland Group plc where he was the Chief Operating Officer and a member of the Group's Executive Committee. He previously held positions as Chief Operating Officer and Finance Director at Ulster Bank, Chief Financial Officer at Airtricity and numerous senior financial roles in GE, both in Ireland and the US.

**Qualifications:** BComm, FCA.

**External appointments:** **Listed:** Not applicable. **Non-listed:** Not applicable.





## Patrick J. Kennedy

### Non-executive Director

**Appointed to the Board:**  
January 2015

**Nationality:**  
Irish

**Age:**  
64

**Committee membership:**  
Acquisitions Committee;  
Nomination & Corporate  
Governance Committee;  
Remuneration Committee

**Skills and experience:** Pat was Chairman of the Executive Board of Directors of SHV Holdings (SHV), a large family-owned Dutch multinational company with a diverse portfolio of businesses, including the production and distribution of energy, the provision of industrial services, heavy lifting and transport solutions, cash and carry wholesale and the provision of private equity. During a 32 year career with SHV, he held various leadership roles across SHV's diverse portfolio of businesses, while living in various parts of the world, and was a member of the Executive Board of SHV from 2001, before becoming Executive Chairman in 2006. He retired from SHV in mid-2014.

**Qualifications:** BComm, MBS.

**External appointments:** **Listed:** Not applicable. **Non-listed:** Member of the Supervisory Board of SHV Holdings N.V.



## Donald A. McGovern, Jr.\*

### Non-executive Director

**Appointed to the Board:**  
July 2013

**Nationality:**  
United States

**Age:**  
67

**Committee membership:**  
Nomination & Corporate  
Governance Committee;  
Remuneration Committee

**Skills and experience:** Don retired from PricewaterhouseCoopers (PwC) in June 2013, following a 39 year career with the firm. During that time he was Vice Chairman, Global Assurance at PwC, a position he had held since July 2008 and directed the US firm's services for a number of large public company clients. He also held various leadership roles in PwC and was, from July 2001 to June 2008, a member of, and past lead Director for, the Board of Partners and Principals of the US firm as well as a member of PwC's Global Board.

**Qualifications:** CPA, MBA.

**External appointments:** **Listed:** Director of Cars.com, Inc.  
**Non-listed:** Director of Neuraltus Pharmaceuticals, Inc. and eAsic Corporation.

\* *Senior Independent Director*



## Heather Ann McShary

### Non-executive Director

**Appointed to the Board:**  
February 2012

**Nationality:**  
Irish

**Age:**  
56

**Committee membership:**  
Audit Committee;  
Remuneration Committee

**Skills and experience:** Heather Ann is a former Managing Director Ireland of Reckitt Benckiser and Boots Healthcare and was previously a non-executive Director of Bank of Ireland plc and IDA Ireland.

**Qualifications:** BComm, MBS.

**External appointments:** **Listed:** Non-executive Director of Greencore Group plc and Jazz Pharmaceuticals plc. **Non-listed:** Director of Ergonomics Solutions International and the Institute of Directors.



## Gillian L. Platt

### Non-executive Director

**Appointed to the Board:**  
January 2017

**Nationality:**  
Canadian

**Age:**  
64

**Committee membership:**  
Nomination & Corporate  
Governance Committee;  
Remuneration Committee

**Skills and experience:** During the course of her executive career, Gillian has held a number of senior leadership positions in a variety of industries, geographies and roles including human resources, corporate affairs and strategy. Most recently she was Executive Vice President and Chief Human Resources Officer at Finning International, Inc. (the world's largest Caterpillar equipment dealer) with global responsibility for human resources, talent development and communications. She previously held senior executive roles at Aviva, the multinational insurance company, as Executive Vice President Human Resources and Executive Vice President Strategy and Corporate Development.

**Qualifications:** Bachelor of Arts from the University of Western Ontario and a Masters of Education from the University of Toronto.

**External appointments:** **Listed:** Non-executive Director of Interfor Corporation, a Canadian listed company, which is one of the world's largest providers of lumber. **Non-listed:** Not applicable.



## Lucinda J. Riches

### Non-executive Director

**Appointed to the Board:**  
March 2015

**Nationality:**  
British

**Age:**  
56

**Committee membership:**  
Nomination & Corporate  
Governance Committee;  
Remuneration Committee

**Skills and experience:** Lucinda spent the majority of her career in investment banking, including 21 years in UBS Investment Bank and its predecessor firms where she worked until 2007. She held senior management positions in the UK and the US, including Global Head and Chairman of UBS's Equity Capital Markets Group and Vice Chairman of the Investment Banking Division.

**Qualifications:** Masters in Philosophy, Politics and Economics and a Masters in Political Science.

**External appointments:** **Listed:** Non-executive Director of Ashtead Group plc, Diverse Income Trust plc and ICG Enterprise Trust plc.

**Non-listed:** Non-executive Director of UK Financial Investments Limited, which manages the UK government's investments in financial institutions, and the British Standards Institution and DIT Income Services Limited.



## Henk Th. Rottinghuis

### Non-executive Director

**Appointed to the Board:**  
February 2014

**Nationality:**  
Dutch

**Age:**  
62

**Committee membership:**  
Acquisitions Committee;  
Audit Committee

**Skills and experience:** Henk has a background in distribution, wholesale and logistics. Until 2010, he was Chief Executive Officer at Pon Holdings B.V., a large, privately held international company which is focused on the supply and distribution of passenger cars and trucks, and equipment for the construction and marine sectors. He was also a member of the Supervisory Board of the Royal Bank of Scotland N.V. and the food-retail group Detailresult Groep.

**Qualifications:** Masters degree in Dutch Law; PMD Harvard Business School.

**External appointments:** **Listed:** Not applicable. **Non-listed:** Member of the Supervisory Board of the retail group Blokker Holding B.V., Chairman of Koole Terminals B.V. Henk also holds several non-profit board memberships.



## William J. Teuber, Jr.

### Non-executive Director

**Appointed to the Board:**  
March 2016

**Nationality:**  
United States

**Age:**  
66

**Committee membership:**  
Audit Committee  
(Financial Expert);  
Finance Committee

**Skills and experience:** Until September 2016, Bill was the Vice Chairman of EMC Corporation. In previous roles he was responsible for EMC's global sales and distribution organisation (2006-2012) and served as Chief Financial Officer (1996-2006). Prior to joining EMC he was a partner in the audit and financial advisory services practice of Coopers & Lybrand LLP.

**Qualifications:** MBA degree from Babson College, a Masters of Science in Taxation from Bentley College and a Bachelors degree from Holy Cross.

**External appointments:** **Listed:** Member of the Board of Directors of Popular, Inc. a diversified financial services company, and Inovalon Holdings, Inc., a healthcare technology company. **Non-listed:** Director of Accedian Networks, a technology company and BGP Bravo Holdings, a technology services company.



## Richard Boucher

### Non-executive Director

**Appointed to the Board:**  
With effect from 1 March 2018

**Nationality:**  
Irish

**Age:**  
59

**Committee membership:**  
Not Applicable

**Skills and experience:** Richie has extensive experience in all aspects of financial services and was Chief Executive of Bank of Ireland Group plc between February 2009 and October 2017. He also held a number of key senior management roles within Bank of Ireland, Royal Bank of Scotland and Ulster Bank. Richie is a consultant for Fairfax Financial Group and acts as its nominee on the boards of investee companies. He is a past President of the Institute of Banking in Ireland and of the Irish Banking Federation.

**Qualifications:** Bachelor of Arts (Economics) from Trinity College, Dublin; Fellow of the Institute of Banking in Ireland.

**External appointments:** **Listed:** Director of Atlas Mara Limited, a company with investments in banks in Africa, and Eurobank Ergasias SA, a bank based in Athens, Greece which has operations in Greece and several other European countries. **Non-listed:** Not applicable.





CRH Annual Report and Form 20-F 2017

# Corporate Governance Report

## Chairman's Overview

The Corporate Governance report contains details of CRH's governance structures and highlights the main areas of focus for the Board during 2017. Details of CRH's general governance practices, which are largely unchanged from prior years, are available in the governance appendix on CRH's website, [www.crh.com](http://www.crh.com) (the "Governance Appendix").

CRH implemented the 2016 UK Corporate Governance Code (the '2016 Code') and complied with its provisions in 2017. A copy of the 2016 Code can be obtained from the Financial Reporting Council's website, [www.frc.org.uk](http://www.frc.org.uk).

## Shareholder Engagement

During the course of 2017, we again saw an increased level of dialogue with institutional shareholders in relation to corporate governance and board effectiveness. As part of our governance engagement process, in the first half of 2017 I met with shareholders together with Don McGovern, Senior Independent Director, and Neil Colgan, Company Secretary. I also had further

meetings later in the year with shareholders who expressed an interest in continuing our dialogue. The broad areas of discussion during these meetings were the resolutions to be considered at the 2017 AGM, auditor independence, succession planning for the Board and the policy for non-executive Director appointments, the Board's role in the area of talent management, CRH's focus on diversity, both in terms of Board appointments and across the Group generally, the timing of the Board's input in relation to acquisition projects, risk management and the Group's remuneration policy. We also noted an increased focus on environmental and social issues and I was pleased to facilitate a meeting between our sustainability team and a shareholder who wished to gain an in-depth understanding of our processes and policies.

During the course of 2018, the Audit Committee will be conducting a tender process for the appointment of a new external auditor to replace Ernst & Young (EY), who must rotate off the CRH audit by 2021 in accordance with European Union rules. Further details on this process are included in the Audit Committee section of this report (on page 64). The governance meetings scheduled for 2018 will provide a forum for discussion of this process with those shareholders who have a particular interest in this issue.

The Directors' Remuneration Report (on page 72) provides further detail in relation to shareholders' perspectives on CRH's remuneration structures.

## Board Focus Areas and Priorities

During the course of 2017, the Board continued to focus on risk management, IT and cyber security, talent management, succession planning and strategy. In relation to talent management, in particular, the Board receives regular updates from the Chief Executive and a committee of a small group of non-executive Directors works closely with him in relation to key senior executive appointments. The Board also continues to monitor developments in relation to negotiations regarding the UK ceasing to be a member of the European Union.

Safety continues to be a key area of focus for the Board. In addition to regular updates throughout the year, during Board visits to our operations in France and Canada in 2017 we had an opportunity to obtain a detailed understanding of various projects, safety initiatives and investment priorities in this critical area. We also had an in-depth review of safety across the Group with the senior management team during the year, with a particular focus on safety strategy and fatality elimination.

## Diversity and Board Renewal

Diversity at Board level has been a focus for the Nomination & Corporate Governance Committee and the Board for a number of years and is a key factor when considering Board renewal. The diversity policy for Board appointments is set out on page 68, together with a summary of the number of female Directors on the Board since 2014. Building diversity below Board level has been slower. To some degree this is related to the nature of CRH's industry. Nevertheless, diversity is one of the main areas of focus for the executive leadership team. The Group is in the process of appointing diversity officers. In addition, in 2018 there will be a number of initiatives focused on improving diversity.

“Diversity at Board level has been a focus for the Nomination & Corporate Governance Committee and the Board for a number of years and is a key factor when considering Board renewal”

Nicky Hartery

Details on Board changes during 2017 and to date in 2018, and the Board renewal process generally, are set out in the Nomination & Corporate Governance section of this report. This section also contains an update on the process to identify my successor as Chairman.

## Independence and Re-election of Directors

The Nomination & Corporate Governance Committee has reviewed the interests of each Director and the Board has determined that each non-executive Director remains independent. In addition, I have evaluated the performance of each Director and I recommend that shareholders vote in favour of the re-appointment of each Director at the 2018 AGM.

## Conclusion

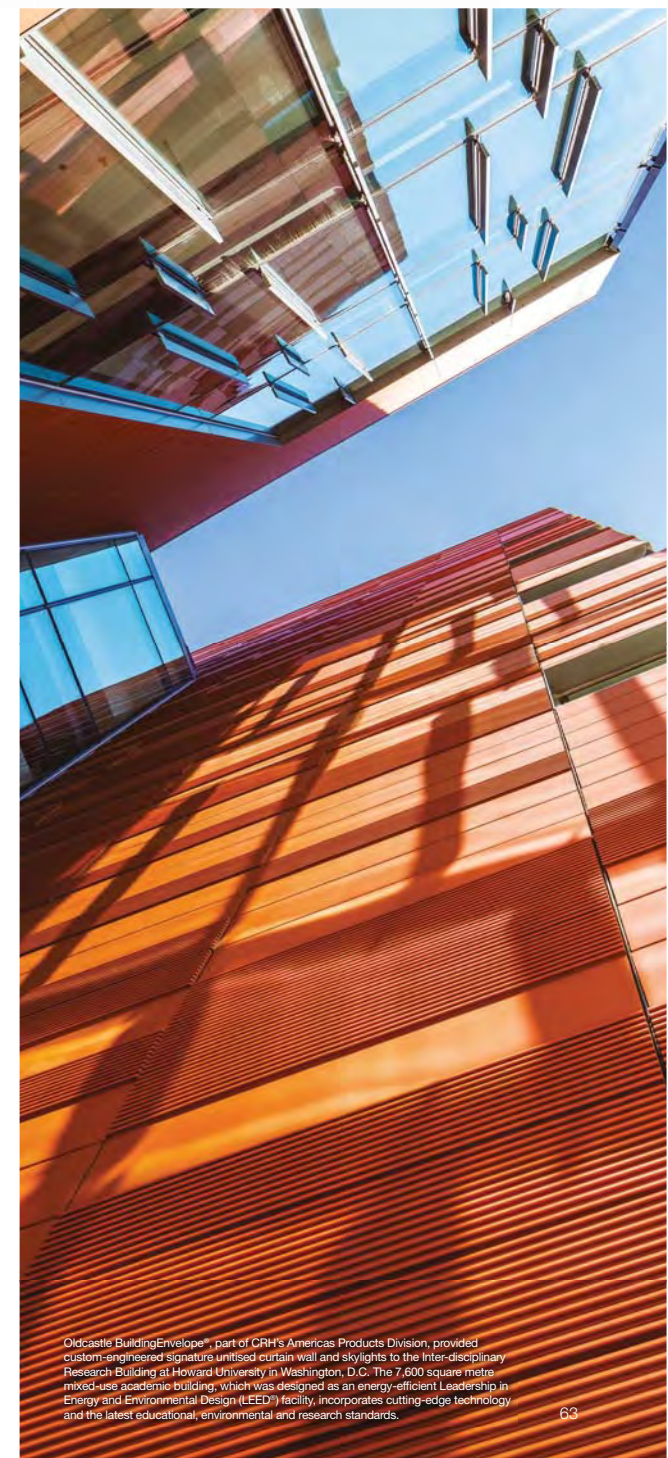
In an ever changing world, it is vital to have a clear insight into the perspectives of our shareholders regarding corporate governance matters. I very much appreciate the time many of you have given to discuss CRH's governance structures and procedures with us over the course of the last year. Our usual process of engagement will continue in 2018.

Nicky Hartery  
Chairman

February 2018

\* The Governance Appendix is published in conjunction with the Directors' Report in compliance with Section 1373 of the Companies Act 2014. For the purposes of Section 1373 (2) of the Companies Act 2014, the Governance Appendix and the risk management disclosures pages 20, 21 and 102 to 107 form part of, and are incorporated by reference into, this Corporate Governance Report.

The primary (premium) listing of CRH plc is on the London Stock Exchange (LSE), with the listing on the Irish Stock Exchange (ISE) characterised as secondary. For this reason, CRH plc is not subject to the same ongoing listing requirements as would apply to an Irish company with a primary listing on the ISE. For further information, shareholders should consult their financial adviser. Further details on the Group's listing arrangements, including its premium listing on the LSE, are set out on page 70.



Oldcastle BuildingEnvelope™, part of CRH's Americas Products Division, provided custom-engineered signature utilised curtain wall and skylights to the Inter-disciplinary Research Building at Howard University in Washington, D.C. The 7,600 square metre mixed-use academic building, which was designed as an energy-efficient Leadership in Energy and Environmental Design (LEED™) facility, incorporates cutting-edge technology and the latest educational, environmental and research standards.



# Corporate Governance Report - continued

## Audit Committee Report

### Chairman's Overview

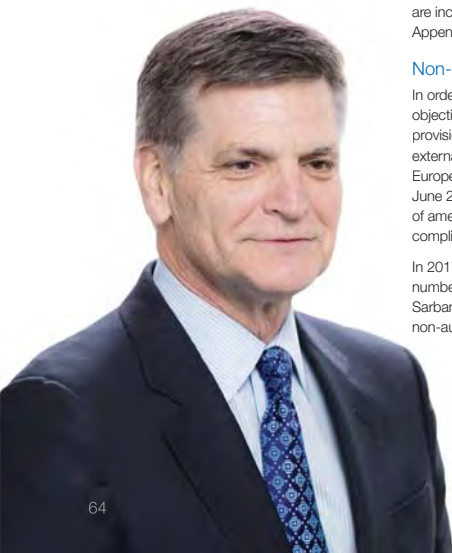
The Board has appointed me as Chairman of the Audit Committee to replace Ernst Bärtschi, who recently resigned from the Board. I would like to thank Ernst for his significant contribution to the work of the Committee during his tenure.

On behalf of the Committee, I am pleased to introduce the Audit Committee Report for the year ended 31 December 2017. The purpose of this report is to provide shareholders with an insight into the workings of, and principal matters considered by, the Committee in 2017. General details in relation to the roles and responsibilities of the Committee, its operation and the policies applied by it can be found in the Governance Appendix.

Table 1 on page 65 outlines the key areas that the Committee focused on in 2017.

### Audit Committee Membership

The Committee currently consists of three non-executive Directors considered by the Board to be independent\*. The biographical details of each member are set out on pages 60 and 61. Together, the members of the Committee bring a broad range of relevant experience and expertise from a variety of industries which is vital in supporting effective governance.



### External Auditors

#### Tender/Rotation of Audit

As outlined in last year's Audit Committee Report, the Committee has recommended to the Board that a tender process for the external audit be conducted during 2018. During 2017, the Committee considered the proposed format of the tender process and an assessment was carried out to identify suitable candidates to participate in the process. A detailed Request for Proposal will be issued in 2018.

#### Effectiveness

The Committee, on behalf of the Board, is responsible for the relationship with EY and for monitoring the effectiveness and quality of the external audit process. The Committee's primary means of assessing the effectiveness of the external audit process is by monitoring performance against the agreed audit plan. Each year the Committee considers the experience and knowledge of the EY audit team and the results of post-audit interviews with management and the Audit Committee Chairman. These annual procedures are supplemented by periodic formal reviews of the performance of EY. All of the above initiatives have indicated a high level of satisfaction with EY and the services provided by them to CRH. Further details in relation to the external auditors, including information on how auditor objectivity and independence are maintained, are included in Section 2 of the Governance Appendix.

#### Non-audit Fees

In order to ensure auditor independence and objectivity, the Committee has a policy on the provision of audit and non-audit services by the external auditor. Following the adoption of the European Union Audit Reform Regulation in June 2016, the Committee approved a number of amendments to the policy in 2017 to ensure compliance with the new requirements.

In 2017, the external auditors provided a number of audit-related services, including Sarbanes-Oxley Section 404 attestation\*\*, and non-audit services, including due diligence

**William J. Teuber, Jr.**  
Chairman of Audit Committee  
Audit Committee Financial Expert (as determined by the Board)

\* The Board has determined that all of the non-executive Directors on the Audit Committee are independent according to the requirements of Rule 10A.3 of the rules of the SEC.  
\*\* A copy of Section 404 of the Sarbanes-Oxley Act 2002 can be obtained from the SEC's website, www.sec.gov.

services associated with proposed acquisitions and disposals. EY were also engaged during 2017 in a number of jurisdictions in which the Group operates to provide help with local tax compliance, advice on taxation laws and other related matters; assignments which typically involve relatively small fees. The Committee is satisfied that the external auditors' knowledge of the Group was an important factor in choosing them to provide these services. The Committee is also satisfied that the fees paid to EY for non-audit work in 2017, which amounted to €2 million and represented 11% of the total fees for the year, did not compromise their independence or integrity. Details of the amounts paid to the external auditors during the year for audit and other services are set out in note 4 to the Consolidated Financial Statements on page 141 (see also table 2 on page 65). Further details in relation to the Group's policy regarding non-audit fees are set out in Section 2 of the Governance Appendix.

### Internal Audit Effectiveness

In December 2016, the Committee received and approved the Internal Audit plan for 2017. During the year, the Committee received regular updates from the Head of Internal Audit outlining the principal findings from the work of Internal Audit and management's responses thereto.

The Committee also considered and approved the proposed Internal Audit strategy for the next five years, which included detailed consideration of the focus, structure and resources required by the Internal Audit function.

### Audit Committee Effectiveness and Priorities for 2018

During 2017, the Committee and the Board reviewed the operation, performance and effectiveness of the Committee and I am pleased to confirm that the Committee continues to operate effectively. As outlined in the Nomination & Corporate Governance Committee section, an external evaluation of the effectiveness of the Board and its Committees, will be carried out in 2018.

I would like to thank my fellow Committee members for their commitment and input to the work of the Committee during 2017.

While the external audit tender process will obviously be an important issue for the Committee in 2018, the Committee will also continue to focus on internal control, external

audit planning, IT governance and cyber security and enterprise risk management.

**William J. Teuber, Jr.**  
Chairman of Audit Committee

February 2018

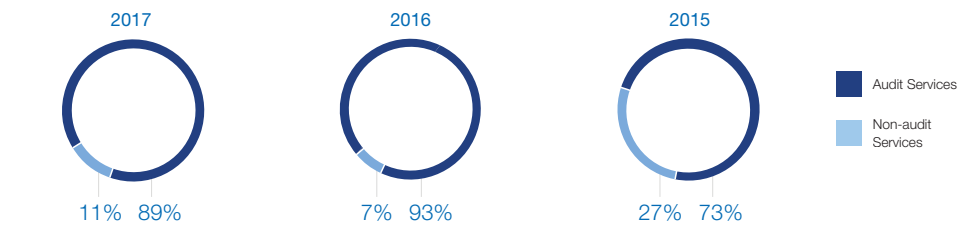
### Key Areas of Focus in 2017

Table 1

Issue	Description
Financial Reporting and External Audit	We reviewed the 2017 Annual Report and Form 20-F, together with the annual, half-year and trading statements for recommendation to the Board. In July, we met with EY to agree the 2017 external audit plan. Table 3 on page 66 outlines the key areas identified as being potentially significant and how we addressed these during the year.
Impairment Testing	Through discussion with both management and EY, we reviewed management's impairment testing methodology and processes. We found the methodology to be robust and the results of the testing process appropriate. There were no impairments in 2017.
New Accounting Standards	In conjunction with management, the Committee considered the proposed timeframes for the Group to implement new accounting standards in relation to <i>Revenue from Contracts with Customers</i> (IFRS 15), <i>Financial Instruments</i> (IFRS 9) and <i>Leases</i> (IFRS 16). Please see pages 125 and 126 for further information on the implementation of these new standards.
Enterprise Risk Management	The Committee continued to monitor and review the Group's Enterprise Risk Management framework and the methodology and process underlying the Viability Statement included on page 98 of the Directors' Report (further details in relation to CRH's risk governance are outlined on pages 20 and 21). We also considered an assessment of the Group's risk management and internal control systems. This had regard to all material controls, including financial, operational and compliance controls that could affect the Group's business.
IT Governance and Cyber Security	We continued to monitor progress in refining the Group's IT governance and information security programme and cyber security capabilities.
External Auditors	EY have been the Group's external auditors since 1988. Following an assessment of EY's continued independence, objectivity and performance, and having received confirmation of their willingness to continue in office, the Committee has recommended to the Board their continuance in office for the 2018 financial year. As in prior years, their continuance in office will be subject to a non-binding advisory vote at the 2018 AGM. Pat O'Neill has been the Group's lead audit engagement partner with effect from the financial year beginning 1 January 2016. As outlined above, the Committee will conduct an external audit tender during 2018.

### Percentage of audit and non-audit fees

Table 2





## Corporate Governance Report - continued

### Audit Committee Report - continued

#### Areas identified for focus during the 2017 External Audit Planning Process

Table 3

Area of Focus	Audit Committee Action
Impairment of Goodwill	For the purposes of its annual impairment testing process, the Group assesses the recoverable amount of each of CRH's cash-generating units (CGUs – see details in note 15 to the Consolidated Financial Statements) based on a value-in-use computation or fair value less costs to sell. The annual goodwill impairment testing was conducted by management, and papers outlining the methodology and assumptions used in, and the results of, that assessment were presented to the Audit Committee. Following its deliberations, the Audit Committee was satisfied that the methodology used by management (including the growth rates) and the results of the assessment, together with the disclosures in note 15, were appropriate.
Impairment of Property, Plant and Equipment, and Financial Assets	In addition to the goodwill impairment testing process discussed above, the Group also undertook its annual assessment of the need for impairment of other non-current assets (property, plant and equipment and financial assets) as and when indicators of impairment exist. The Audit Committee considered the methodology used by management in that process and was satisfied that it was appropriate.
Contract Revenue Recognition	IAS 11 <i>Construction Contracts</i> requires revenue and expenses to be recognised on uncompleted contracts, with the underlying principle that, once the outcome of a long-term construction contract can be reliably estimated, revenue and expenses associated with that contract should be recognised by reference to the stage of completion of the contract activity at the balance sheet date. If it is anticipated that the contract will be loss-making, the expected loss must be recognised immediately. Following discussions with management and EY, the Audit Committee was satisfied that contract revenue recognition was not a material issue for the Group in 2017 as the majority of contracts were completed within the financial year.
Accounting for Acquisitions and Divestments - appropriate application of IFRS 5 <i>Non-current Assets Held for Sale and Discontinued Operations</i>	During 2017, the Group completed 34 acquisitions and investments at a total cost of €1.9 billion. Following discussion with management and EY, the Committee was satisfied that the accounting treatment applied to acquisitions during 2017 was appropriate. During 2017, the Group also announced its decision to divest its Americas Distribution business for US\$2.6 billion. As at 31 December 2017, Americas Distribution met the Held for Sale and Discontinued Operations criteria and has been classified as such in the Consolidated Financial Statements (see note 2 for more details). Following discussion with management and EY, the Committee was satisfied that the treatment applied to Americas Distribution was correct.

## Nomination & Corporate Governance Committee Report

### Chairman's Overview

During 2017, the Nomination & Corporate Governance Committee has focused on the renewal and refreshment of the Board, particularly in the context of Chairman succession, and the role and composition of the Board's Committees.

### Board Renewal/Chairman Succession

As part of the Board renewal process, the Committee uses a skills matrix to map the current skills of the Board. This facilitates the identification of skills gaps, areas of expertise and knowledge which may be lost to the Board due to retirements. This also provides a framework when establishing priorities for appointments and developing role specifications.

As a result of recent Board changes in 2017 and to date in 2018, the number of female directors will reduce from 33% to 27%. This is intended to be short term in nature. CRH's policy on diversity in respect of Board appointments and the percentage of female Directors on the Board since 2014 is set out on pages 68 and 69. During the year the Committee noted the Parker Review initiative to improve ethnic diversity on Boards and will consider this as the renewal policy evolves.

In August 2017, Maeve Carton retired from the Board and as an executive. In December 2017, Ernst Bärtschi also left the Board.

The Committee recommended to the Board that Pat Kennedy and Lucinda Riches who had both completed their initial three year term as non-executive Directors each be appointed for a second three year term. The Committee has also recommended that Heather Ann McSharry be appointed for a third term of three years.

In 2017, the Committee engaged Irish and international recruitment agencies to identify candidates for the role of non-executive Director. As a result of that process, Richard Boucher will be appointed to the Board with effect from 1 March 2018. We also identified some candidates who were not available to join the Board at the present time but who will remain part of our longer term pipeline of prospective candidates. Amongst the factors reflected in the terms of reference agreed with the agencies for the recruitment process were the blend of skills required by the Board, both now and in the next few years, the need to ensure appropriate levels of gender diversity on the Board and the

desire of the Board to have a strong pool of candidates for key non-executive positions.

Last year I reported that the Committee had commenced a process to consider the requirements for the appointment of my successor as Chairman. Led by the Senior Independent Director, Don McGovern, the Committee put in place a detailed job specification for the role. A thorough and robust process to identify my successor is ongoing. In order to aid the transition in due course, the Board has asked me to extend my term as Chairman, which was due to expire in April this year. I have acceded to this request to act as a bridge until my successor has been identified and a timeline for induction and appointment has been agreed.

External agents (Korn Ferry and Leaders Mores) were used to identify candidates during the course of 2017 and to date in 2018. Korn Ferry provide other services to the Group in the area of human resources.

### Safety, Environmental & Social Responsibility Committee

In CRH, safety and sustainability issues are important to our employees, the management team and the Board. To reflect this, and to ensure that the Board gives an appropriate level of focus to monitoring and supporting various initiatives, the Board has decided to put in place a dedicated Safety, Environmental & Social Responsibility Committee during 2018.

### Committee Composition

Following Ernst Bärtschi's resignation from the Board, the Committee recommended that Bill Teuber be appointed as Chairman of the Audit Committee. Bill has been a member of the Audit Committee since 2016 and has previously been designated as the Audit Committee's financial expert.

During the course of 2018, the Committee will consider the composition of the Board's Committees, including the new Safety, Environmental & Social Responsibility Committee.

### Time Commitment

With effect from 1 January 2018, I have taken over the role of non-executive Chairman of Musgraves, a non-listed food retailing company which I have been a director of for a number of years. I am satisfied that the incremental

responsibilities resulting from this new position will not impact on my time commitment to CRH. Prior to accepting the role, I discussed the nature of, and the time requirement associated with, the position with the Nomination & Corporate Governance Committee.

### Board Effectiveness

In accordance with the Board's procedures, the Senior Independent Director has interviewed all Directors to evaluate the effectiveness of the operation of the Board and its Committees. Action points and recommendations arising from the resulting report will be addressed during the course of 2018. In addition, each of the Committees reviewed its own performance during the course of the year. An externally facilitated Board evaluation in relation to the effectiveness of the Board and its Committees will be carried out later this year.

### Nicky Hartery

*Chairman of Nomination & Corporate Governance Committee*

February 2018







## Corporate Governance Report - continued

### Nomination & Corporate Governance Committee Membership

The Nomination & Corporate Governance Committee consists of five non-executive Directors, considered by the Board to be independent. The biographical details of each member are set out on pages 59 to 61. The Chief Executive normally attends meetings of the Committee.

### Board of Directors

#### Membership Structure of the Board

We consider the current size and composition of the Board to be within a range which is appropriate. The spread of nationalities of the Directors reflects the geographical reach of the Group and we consider that the Board as a whole has the appropriate blend of skills, knowledge and experience, from a wide range of industries, regions and backgrounds, necessary to lead the Group. Section 1 of the Governance Appendix on the CRH website ([www.crh.com](http://www.crh.com)) contains further details on the Board's structures and the Board's policies with regard to the appointment and retirement of Directors.

#### Role and Responsibilities of the Board

The Board is responsible for the leadership, oversight, control, development and long-term success of the Group. It is also responsible for instilling the appropriate culture, values and behaviour throughout the organisation. There is a formal schedule of matters reserved to the Board for consideration and decision. This includes the matters set out in table 4.

The Group's strategy, which is regularly reviewed by the Board, and business model are summarised on pages 10 to 13.

The Board has delegated some of its responsibilities to Committees of the Board. While responsibility for monitoring the effectiveness of the Group's risk management and internal control systems has been delegated to the Audit Committee, the Board retains ultimate responsibility for determining the Group's risk appetite and tolerance, and annually considers a report in relation to the monitoring, controlling and reporting of

identified risks and uncertainties. In addition, the Board receives regular reports from the Chairman of the Audit Committee in relation to the work of that Committee in the area of risk management.

Individual Directors may seek independent professional advice, at the expense of the Company, in the furtherance of their duties as a Director.

The Group has a Directors' and Officers' liability insurance policy in place.

#### Chairman

Nicky Hartery was appointed Chairman of the Group in 2012. On his appointment as Chairman, he met the independence criteria set out in the 2016 Code. Although he holds a number of other directorships, the Board has satisfied itself that these do not impact on his role as Chairman. Changes in Mr. Hartery's time commitments in the past 12 months are outlined in the Nomination & Corporation Governance Committee section on page 67.

#### Policy on Diversity

We are committed to ensuring that the Board is sufficiently diverse and appropriately balanced. In its work in the area of Board renewal, the Nomination & Corporate Governance Committee looks at the following four criteria when considering non-executive Director candidates:

- international business experience, particularly in the regions in which the Group operates or into which it intends to expand;
- skills, knowledge and expertise (including education or professional background) in areas relevant to the operation of the Board;
- diversity, including nationality and gender; and
- the need for an appropriately sized Board

During the ongoing process of Board renewal, each, or a combination, of these factors can take priority.

In 2014, the Board set itself a goal of increasing the number of female Directors to 25%. The progress made since is shown in table 6.

To date, the Board has not set any policy regarding age. The ages of the Directors range from 49 to 67, which the Nomination & Corporate Governance Committee believes is appropriate at the current time.

#### Committees

The Board has established five permanent Committees to assist in the execution of its responsibilities. The current permanent Committees are:

- Acquisitions
- Audit
- Finance
- Nomination & Corporate Governance
- Remuneration

In addition, a Safety, Environmental & Social Responsibility Committee will be set up during the course of 2018. Ad-hoc Committees are formed from time to time to deal with specific matters.

Each of the permanent Committees has "Terms of Reference", under which authority is delegated to them by the Board. The Chairman of each Committee reports to the Board on its deliberations and minutes of all Committee meetings are circulated to all Directors. The Chairmen of the Committees attend the AGM and are available to answer questions from shareholders.

Each of the Committees has reviewed their respective Terms of Reference.

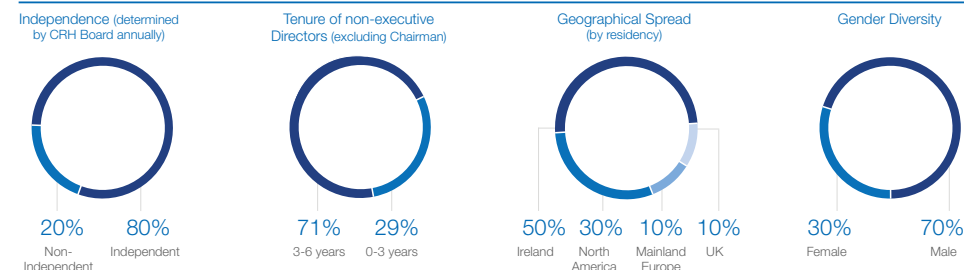
The Terms of Reference of each Committee are available on the CRH website, [www.crh.com](http://www.crh.com).

#### Matters reserved to the Board Table 4

- Appointment of Directors
- Strategic plans for the Group
- Annual budget
- Major acquisitions and disposals
- Significant capital expenditure
- Approval of full-year results and the Annual Report and Form 20-F
- Approval of the interim results

### Membership of the CRH Board (as at 28 February 2018)

Table 5



### % Female Directors at 31 December

Table 6

	2013	2014	2015	2016	2017
% Female Directors	15%	23%	29%	33%	30%

### Attendance at meetings during the year ended 31 December 2017

Table 7

Name	Board		Acquisitions		Audit		Finance		Nomination & Corporate Governance		Remuneration	
	Total	Attended	Total	Attended	Total	Attended	Total	Attended	Total	Attended	Total	Attended
E.J. Bärtschi (i)	6	6	-	-	7	7	5	5	-	-	-	-
M. Carton (ii)	4	4	4	4	-	-	3	3	-	-	-	-
N. Hartery	6	6	5	5	-	-	5	5	5	5	-	-
P.J. Kennedy	6	6	5	5	-	-	-	-	5	5	9	9
D.A. McGovern, Jr.	6	6	-	-	-	-	-	-	5	5	9	9
H.A. McSharry	6	6	-	-	7	7	-	-	-	-	9	9
A. Manifold	6	6	5	5	-	-	-	-	-	-	-	-
S. Murphy	6	6	5	5	-	-	5	5	-	-	-	-
G.L. Platt (iii)	6	6	-	-	-	-	-	-	4	4	6	6
L.J. Riches	6	6	-	-	-	-	-	-	5	5	9	9
H. Th. Pottinghuis	6	6	5	5	7	7	-	-	-	-	-	-
W.J. Teuber, Jr.	6	6	-	-	7	7	5	5	-	-	-	-

(i) Resigned December 2017

(ii) Retired August 2017

(iii) Appointed January 2017

All Directors attended the 2017 AGM.

\* In accordance with Section 167(7) of the Companies Act 2014.

\*\* The Terms of Reference of these Committees comply fully with the 2016 Code; CRH considers that the Terms of Reference are generally responsive to the relevant NYSE rules, but may not address all aspects of these rules.



# Corporate Governance Report - continued

## Substantial Holdings

The Company is not owned or controlled directly or indirectly by any government or by any corporation or by any other natural or legal person severally or jointly. The major shareholders do not have any special voting rights. Details of the substantial holdings as at 31 December 2017 are provided in table 8. The Company has not been advised of any changes in holdings since 31 December 2017.

## Stock Exchange Listings

CRH, which is incorporated in Ireland and subject to Irish company law, has a premium listing on the London Stock Exchange (LSE), a secondary listing on the Irish Stock Exchange (ISE) and its American Depository Shares are listed on the New York Stock Exchange (NYSE).

## Regulatory, Compliance & Ethics

CRH's Regulatory, Compliance & Ethics (RCE) programmes support the Group in operating sustainably and consistently to its core values of integrity, honesty and respect for the law.

RCE provides support on a range of matters including compliance risk assessments, export controls and sanctions processes, monitoring of hotline calls, competition/antitrust law as well as preparation for the implementation of the European Union General Data Protection Regulations (GDPR).

## Awareness and Training

In line with our commitment to maintain high ethical business standards, the Code of Business Conduct (CoBC) and Advanced

Compliance Training (ACT - including Anti-bribery, Anti-Fraud, Anti-theft and Competition/Antitrust) e-Learning modules were reviewed, redesigned and distributed in 23 languages during the year.

In addition, new GDPR and Data Privacy e-Learning modules were developed for general awareness amongst the CRH businesses and also for specific business functions.

During 2017, RCE has worked with HR, IT, legal and business teams to develop policies, guidance and implementation plans as part of preparations to address the impact of GDPR. A robust communication plan is in place to complement the training programmes and promote awareness among employees.

## Hotline

A 24/7 multi-lingual confidential "Hotline" facility called "Speak Up" is available to employees to report issues that concern them, for example issues concerning business ethics or conduct. The "Hotline" is maintained by an independent operator.

All reports received via the Hotline (or through other channels) are investigated with appropriate actions taken based on investigation findings. The collective goal is to ensure that the message is clearly understood that at CRH "there is never a good business reason to do the wrong thing".

## Communications with Shareholders

Communications with shareholders are given high priority and the Group devotes considerable time and resources each year to

shareholder engagement. We recognise the importance of effective dialogue as an integral element of good corporate governance. The Investor Relations team, together with the Chief Executive, Finance Director and other senior executives, regularly meet with institutional shareholders (each year covering over 60% of the shareholder base). Detailed reports on the issues covered in those meetings and the views of shareholders are circulated to the Board after each group of meetings. Table 10 provides a brief outline of the nature of the activities undertaken by our Investor Relations team.

In addition to the above, major acquisitions are notified to the Stock Exchanges in accordance with the requirements of the Listing Rules and development updates, giving details of other acquisitions completed and major capital expenditure projects, are issued periodically.

During 2017, the Chairman, Senior Independent Director and Company Secretary again participated in a number of meetings with some of the Group's major shareholders, details of which are set out in the Chairman's letter on page 62.

We also respond throughout the year to correspondence from shareholders on a wide range of issues.

Table 8

## Substantial Holdings

As at 31 December 2017, the Company had received notification of the following interests in its Ordinary Share capital, which were equal to, or in excess of, 3%:

Name	31 December 2017		31 December 2016		31 December 2015	
	Holding/ Voting Rights	% at year end	Holding/ Voting Rights	% at year end	Holding/ Voting Rights	% at year end
Baillie Gifford Overseas Limited and Baillie Gifford & Co.	Holding below 3%		33,171,299	3.98	41,193,797	5.00
BlackRock, Inc. (i)	75,119,286	8.95	74,809,499	8.98	74,030,167	8.99
Standard Life Aberdeen plc.	25,643,747	3.05	Holding below 3%		Holding below 3%	
UBS AG	26,380,604	3.14	26,380,604	3.16	26,380,604	3.20

(i) BlackRock, Inc. has advised that its interests in CRH shares arise by reason of discretionary investment management arrangements entered into by it or its subsidiaries.

## US Listing - Additional Information

Table 9

Additional details in relation to CRH's general corporate governance practices are set out in the Governance Appendix, which has been filed as an exhibit to the Annual Report on Form 20-F as filed with the SEC. For the purposes of the Annual Report on Form 20-F, the Governance Appendix, and in particular the following sections thereof, are incorporated by reference herein:

### Section 1 - Frequently Asked Questions

- Page 3: For what period are non-executive Directors appointed?
- Page 3: What are the requirements for the retirement and re-election of Directors?

### Section 2 - Operation of the Board's Committees

- Page 6: Audit Committee: Role and Responsibilities
- Page 6: Audit Committee: Meetings
- Page 8: Audit Committee: Non-audit Fees

In addition, details of the executive Directors' service contracts and the policy for loss of office are set out in the 2016 Directors' Remuneration Policy, a copy of which has been filed as an exhibit to the Annual Report on Form 20-F as filed with the SEC and is incorporated by reference herein.

## Investor Relations Activities

Table 10

- **Formal Announcements:** including the release of the annual and interim results and the issuance of trading statements. These announcements are typically accompanied by presentations and webcasts or conference calls.
- **Investor Roadshows:** typically held following the release of formal announcements, provide an opportunity for the management team to meet existing and/or potential investors in a concentrated set of meetings.
- **Industry Conferences:** attendance at key sector and investor conferences affords members of the senior management team the opportunity to engage with key investors and analysts.
- **Investor Briefings:** in addition to regular contact with investors and analysts during the year, the Company periodically holds capital market days, which include presentations on various aspects of CRH's operations and strategy and provide an opportunity for investors and analysts to meet with CRH's wider management team.
- **Media Briefings:** each year, the Company provides media briefings on numerous issues.

## The following are available on the CRH website (www.crh.com)

Table 11

### Corporate Governance

- Governance Appendix
- Directors' Remuneration Policy (2016 - 2019)
- Terms of Reference of the Acquisitions, Audit, Finance, Nomination & Corporate Governance and Remuneration Committees

- Memorandum and Articles of Association of the Company
- Pre-approval policy for non-audit services provided by the auditors
- Compliance & Ethics statement, Code of Business Conduct and Hotline contact numbers

### Investors

- Annual and Interim Reports, the Annual Report and Form 20-F (separate documents up to 2015) and the annual Sustainability Report
- News releases
- Webcast recordings of results briefings
- General Meeting dates, notices, shareholder circulars, presentations and poll results
- Answers to Frequently Asked Questions, including questions regarding dividends and shareholder rights in respect of general meetings



# Directors' Remuneration Report

## Chairman's Overview

### Introduction

As Chairman of the Remuneration Committee, I am pleased to present the Directors' Remuneration Report for the year ended 31 December 2017. As in previous years, the main report is split into three sections:

- this Chairman's Statement (pages 72 and 73);
- a summary of the main features of the Directors' Remuneration Policy (the "Policy") approved by shareholders at the 2016 AGM (pages 76 to 83). The full Policy is detailed in the Group's 2015 Annual Report (pages 95 to 106); and
- the Annual Report on Remuneration (pages 84 to 95)

We have also included a remuneration summary on page 73, which provides an overview of the key remuneration outcomes for 2017, as well as the proposed remuneration arrangements for 2018.

### 2017 Performance

2017 was a year of continued profit growth for CRH. With a focus on performance improvement and operational delivery, margins

and returns were ahead of 2016 in our Americas and Europe Divisions. Supported by strong operational cash generation we continued to deliver value through efficient capital management.

### 2017 Performance Highlights

Earnings Per Share:	226.8 cent
Operating Cash Flow:	€2.2 billion
Return on Net Assets:	10.6%
Total Shareholder Return*:	17.2%

\* Annualised three-year Total Shareholder Return to 31 December 2017

### Incentive Outcomes for 2017

The Group's performance in 2017, as well as individual performance during the year, has translated into annual bonus payouts of between 90% and 96% of the maximum opportunity.

The Committee also determined that 78.7% of the awards made in 2015 under the 2014 Performance Share Plan (PSP) had met the relevant performance criteria as performance in relation to TSR (75% of the award) and cumulative cash flow (25% of the award) metrics exceeded the relevant threshold targets for vesting. The Committee considers that the vesting outcome is reflective of the Group's underlying performance over the applicable performance period (1 January 2015 to 31 December 2017). In accordance with the Policy, the 2015 awards for the executive Directors will vest in 2020 on completion of an additional two-year hold period (see page 84 for more details).

Further details in relation to the remuneration received by the executive Directors are set out in the Annual Report on Remuneration on pages 75 to 95.

### Shareholder Engagement

The Committee is committed to engaging with shareholders to understand their views on remuneration. Prior to the AGM in 2017 we received feedback from investors holding approximately one third of the shares in issue on a range of topics including the Policy and its implementation. We continued to engage with shareholders in 2017; we subsequently contacted investors holding 70% of the shares in issue and received valuable feedback not only on the Committee's

specific proposals for 2018 but on our approach to remuneration generally. I appreciate the time taken by shareholders to engage with the Committee on remuneration matters.

The outcome of the vote on the Annual Report on Remuneration at the 2017 AGM is shown in table 15. We will consider the full range of views from shareholders when we begin the process of reviewing the Remuneration Policy, which is scheduled to be voted on by shareholders at the 2019 AGM.

### Remuneration in 2018

In 2017, the Committee carried out a review of Senan Murphy's Finance Director remuneration package. The drivers for the review were as follows:

- Senan was appointed as Finance Director in January 2016 on a significantly below-market salary, with the expectation that his salary would increase over time;
- Since his appointment Senan has performed exceptionally well and grown significantly in his role, and is a key member of the Group's executive leadership team; and
- 2017 was a year of change for the executive team at CRH, with Mark Towe (Chairman, CRH Americas) and Maeve Carton (Group Transformation Director) retiring from the Board on 31 December 2016 and 31 August 2017 respectively. Following these changes, Senan's remit expanded to include certain areas that previously fell within Maeve's responsibility in her Group Transformation Director role. However, he retained responsibility for his existing functions (which includes performance management, a function that did not previously report to his predecessors)

The review highlighted that Senan's current overall remuneration package was significantly below market when compared to similar roles in FTSE 50 companies (excluding financial services) and sector peer companies, driven primarily by a lower quartile salary compared with market.

The Committee, therefore, believed an adjustment was necessary and consulted with shareholders on a proposal to increase his base salary to broadly bring him into line with the market. While the majority of shareholders who responded to the consultation were in

favour of the proposal put forward, a number of shareholders queried whether the level of salary increase proposed was appropriate in a single year, particularly following the percentage increase he received in 2017. In addition, we received feedback suggesting that any adjustments should increase shareholder alignment.

Taking all of the feedback into account, the Committee decided to increase Senan's salary by 9.8%, which is materially less than initially proposed. In addition, the Committee has taken steps to increase shareholder alignment by increasing Senan's PSP award level in 2018 by 25% of salary, while at the same time increasing his shareholding requirement from one times salary to two times salary to be achieved within five years. The revised proposal results in a position whereby Senan's total expected remuneration remains significantly below market. Overall, the Committee believes that the changes are fair, balanced and to the extent possible are reflective of the full range of feedback received from the consultation process.

For 2018, Albert Manifold will receive an increase in salary of 3%, which is broadly consistent with the average increases for executives in CRH's core geographies and the increase for the wider workforce. The other elements of his remuneration will remain unchanged.

As outlined above, Senan Murphy's salary will increase by 9.8%, taking his salary to €775,000. In addition, his PSP award for 2018 will increase to 225% of salary (previously 200% of salary).

### 2018 Annual Bonus Plan

The metrics for the 2018 annual bonus are unchanged from last year, and are set out in table 13.

### 2018 Performance Share Plan Awards

The metrics and targets for awards to be made under the PSP in 2018 are set out in table 29 on page 87.

The Committee is aware that a number of shareholders would like to see a returns based metric introduced when possible. At present, the Committee believes that the focus on TSR and Cashflow remains appropriate in terms of the Group's current strategic priorities. Return on Net Assets (RONA) remains a core element of the Annual Bonus Plan and will continue to

be an underpin for the TSR element of PSP awards made in 2018, whereby at the end of the performance period the Committee will carefully consider the RONA performance of the business. The PSP outcome may be adjusted downwards if RONA performance has not met the expectations of the Board.

The Committee will continue to evaluate the mix of metrics for the PSP and, in particular, will take this issue into consideration when considering the updated Remuneration Policy to be put to shareholders for consideration in 2019.

### Board changes

Maeve Carton retired from the Board and from CRH on 31 August 2017. All elements of Maeve's remuneration have been treated in line with the Remuneration Policy and relevant plan rules. Details are outlined in table 16 on page 74. Maeve has also entered into an agreement to provide consultancy services to the Group for a maximum of 40 days per year at a rate of

€2,500 per day. As a result, the Group will retain access to Maeve's significant knowledge of the industry and she may continue to represent CRH in key strategic relationships.

### Conclusion

The Committee believes that the remuneration paid to the executive Directors in respect of 2017 is appropriate and is well aligned with the performance of the Company and the value delivered for shareholders. We hope to receive your support for the Annual Report on Remuneration at the 2018 AGM. In addition, I look forward to engaging further with shareholders as we undertake a review of our Policy later this year.

**Donald A. McGovern, Jr.**  
Chairman of Remuneration Committee

28 February 2018

## Executive Directors' Remuneration Summary

### 2017 Remuneration Snapshot

(full details of 2017 remuneration are set out in table 17 on page 75)

Table 12

Director	Fixed	Performance Related Variable Remuneration	
	Salary	Annual Bonus (% of max)	Value of PSP awarded in 2015 (ii) (% of max)
Albert Manifold	€1,442,000	96%	78.7%
Maeve Carton (i)	€470,475	90%	78.7%
Senan Murphy	€705,713	96%	Not applicable (iii)

(i) Retired from the Board and from CRH on 31 August 2017. The salary in the table above is pro-rated for service to her retirement. The equivalent salary for 12 months would be €705,713. Details of her remuneration arrangements on retirement are set out in table 16 on page 74.

(ii) The awards, for which performance was measured over the three-year period to end 2017, will vest at 78.7% in 2020 following the completion of a two-year holding period. Further details in relation to the estimated value of the awards, split between the value created for performance and the value created through share price growth, are included in table 17 on page 75. The market value per share on the date of award (March 2015) was €24.42.

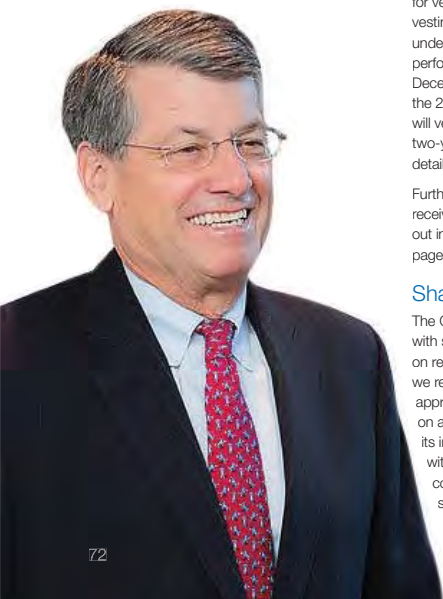
(iii) Appointed to the Board in January 2016.

### 2018 Remuneration Snapshot

Table 13

Director	Salary	Max. Annual Bonus (% of salary)	Metrics for 2018 Award	2018 PSP Award (% of salary)	Metrics for 2018 PSP Award
Albert Manifold	€1,485,260 +3%	225%	<ul style="list-style-type: none"> <li>• EPS (25%)</li> <li>• RONA (25%)</li> <li>• Operating cash flow (30%)</li> <li>• Personal/ Strategic (20%)</li> </ul>	365%	<ul style="list-style-type: none"> <li>• TSR (50%) (i)</li> <li>• Cash flow (50%)</li> </ul>
Senan Murphy	€775,000 +9.8%	150%		225%	

(i) Subject to a RONA underpin.

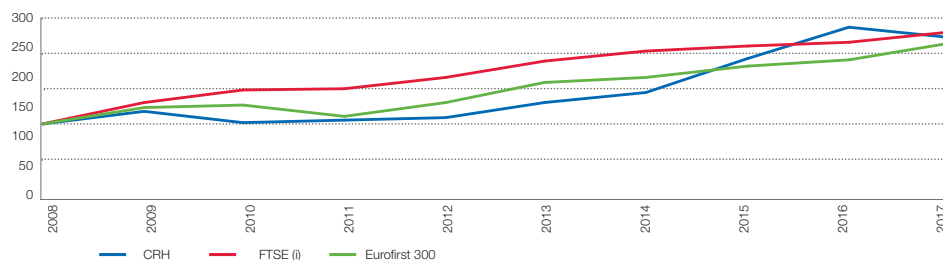




## Directors' Remuneration Report - continued

TSR Performance (2008 - 2017)

Table 14



(i) For the purposes of comparability, the FTSE100 Index is converted to euro using the closing exchange rate at each year-end.

2017 AGM – Remuneration Related Votes (i)

Table 15

	Year of AGM	% in Favour	% Against	No. of votes withheld	Total No. of Votes Cast (incl. votes withheld)	% of issued share capital voted
Directors' Remuneration Report ("Say on Pay")	2017	82.31	17.69	8,260,492	522,037,881	62.45

(i) The outcome of the remuneration related votes at the 2016 AGM is set out on page 94 of the 2016 Annual Report and Form 20-F.

Maeve Carton – Remuneration Arrangements on Retirement

Table 16

Salary	Maeve received her normal salary up to the date of her retirement.
Bonus	Maeve received a pro-rated bonus in respect of performance from 1 January 2017 to her date of retirement. The bonus was paid entirely in cash.
Pension	As outlined in table 17 on page 75, Maeve received her normal supplementary taxable non-pensionable cash allowance, pro-rated for service from 1 January 2017 to her date of retirement.
2014 Performance Share Plan	<b>Unvested Awards:</b> Maeve's outstanding unvested awards (i.e. the awards made in 2015, 2016 and 2017) will be released on their normal release dates subject to performance (to be measured at the normal time) and will be subject to the normal two-year holding period. <b>Vested Awards:</b> Maeve's vested awards (i.e. the award made in 2014) will be released at the normal release date following the completion of the two-year holding period.
Deferred Share Awards	Maeve's outstanding awards (i.e. the awards in relation to her 2015, 2016 and 2017 bonuses), adjusted for dividends accruing from the date of award, were released to her in November 2017.
2010 Savings-related Share Option Scheme	Maeve's outstanding award (i.e. the award granted in 2014) will remain in force and will vest at the normal vesting date in 2019.

Individual Executive Remuneration for the year ended 31 December 2017 (Audited)

Table 17

	Albert Manifold			Maeve Carton <sup>(i)</sup>			Senan Murphy <sup>(ii)</sup>			Mark Towe <sup>(iii)</sup>		
	2017	2016	2015	2017	2016	2015	2017	2016	2015	2017	2016	2015
<b>Fixed Pay</b>	<b>€000</b>	<b>€000</b>	<b>€000</b>	<b>€000</b>	<b>€000</b>	<b>€000</b>	<b>€000</b>	<b>€000</b>	<b>€000</b>	<b>€000</b>	<b>€000</b>	<b>€000</b>
Basic Salary (iv)	1,442	1,400	1,290	470	689	675	706	625	-	-	1,309	1,280
Benefits (v)	35	22	22	18	10	10	25	22	-	-	74	72
Retirement Benefit Expense (vi)	677	671	607	135	252	282	176	156	-	-	262	256
<b>Total Fixed Pay</b>	<b>2,154</b>	<b>2,093</b>	<b>1,919</b>	<b>623</b>	<b>951</b>	<b>967</b>	<b>907</b>	<b>803</b>	<b>-</b>	<b>-</b>	<b>1,645</b>	<b>1,608</b>
<b>Performance Related Pay</b>												
Annual Bonus (vii):												
Cash Element	2,338	2,323	1,451	634	748	734	762	679	-	-	1,447	1,416
Deferred Shares	779	774	484	-	250	245	254	227	-	-	483	472
<b>Total Annual Bonus</b>	<b>3,117</b>	<b>3,097</b>	<b>1,935</b>	<b>634</b>	<b>998</b>	<b>979</b>	<b>1,016</b>	<b>906</b>	<b>-</b>	<b>-</b>	<b>1,930</b>	<b>1,888</b>
Long-term Incentives (viii):												
Performance Share Plan												
- value delivered through performance	2,720	3,171	907	1,138	1,320	630	-	-	-	-	2,155	1,134
- value delivered through share price growth	668	1,622	466	280	675	323	-	-	-	-	1,102	588
Vested Share Options	-	-	209	-	-	145	-	-	-	-	-	266
<b>Total Long-term Incentives</b>	<b>3,388</b>	<b>4,793</b>	<b>1,582</b>	<b>1,418</b>	<b>1,995</b>	<b>1,098</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3,257</b>	<b>1,988</b>
<b>Total Performance Related Pay</b>	<b>6,505</b>	<b>7,890</b>	<b>3,517</b>	<b>2,052</b>	<b>2,993</b>	<b>2,077</b>	<b>1,016</b>	<b>906</b>	<b>-</b>	<b>-</b>	<b>5,187</b>	<b>3,876</b>
<b>Total Single Figure (fixed and performance-related)</b>	<b>8,659</b>	<b>9,983</b>	<b>5,436</b>	<b>2,675</b>	<b>3,944</b>	<b>3,044</b>	<b>1,923</b>	<b>1,709</b>	<b>-</b>	<b>-</b>	<b>6,832</b>	<b>5,484</b>

(i) Maeve Carton retired as a Director and from CRH on 31 August 2017.

(ii) Senan Murphy was appointed as a Director with effect from 1 January 2016.

(iii) Mark Towe retired as a Director on 31 December 2016.

(iv) **Basic Salary:** Further details and background in relation to the changes in salaries effective for 2017 are set out on page 73 of the 2016 Directors' Remuneration Report.

(v) **Benefits:** For executive Directors these relate principally to the use of company cars, medical insurance and life assurance and, where relevant, the value of the non-taxable discount on the grant of options under the Group's 2010 SAYE Scheme and any retirement gifts.

(vi) **Retirement Benefit Expense:** As noted on page 92, Albert Manifold and Maeve Carton each receive a supplementary taxable non-pensionable cash allowance, in lieu of prospective pension benefits foregone. These allowances are similar in value to the reduction in the Company's liability represented by the pension benefit foregone. They are calculated based on actuarial advice as the equivalent of the reduction in the Company's liability to each individual and spread over the term to retirement as annual compensation allowances. Following her retirement on 31 August 2017, the amount due to Maeve Carton has been pro-rated for service in the period from 1 January 2017 to 31 August 2017. Senan Murphy receives a supplementary taxable non-pensionable cash supplement equivalent to 25% of his annual base salary in lieu of a pension contribution.

(vii) **Annual Bonus Plan:** Under the executive Directors' Annual Bonus Plan for 2017, a bonus was payable for meeting clearly defined and stretch targets and strategic goals. The structure of the 2017 Annual Bonus Plan, together with details of the performance against targets and payouts in respect of 2016 and 2017, are set out on page 85. For 2017, 2016 and 2015 bonuses, 25% of executive Directors' bonuses were paid in Deferred Shares, vesting after three years, with no additional performance conditions. In the case of Maeve Carton, following her retirement in 2017 the Remuneration Committee determined that the Deferred Shares in respect of the bonuses granted in 2015 and 2016 should be released to her and that her 2017 bonus, pro-rated for service to her retirement in August 2017, should be paid in cash.

(viii) **Long-term Incentives:** In February 2018, the Remuneration Committee determined that 78.7% of the performance conditions which applied to the PSP awards made in 2015 have been met. The awards are subject to a two-year holding period and will vest in 2020. For the purposes of this table, the value of these awards (including accrued dividend equivalents), which were subject to a three-year performance period ending in 2017, has been estimated using a share price of €30.42, being the three-month average share price to 31 December 2017. Amounts in the long-term incentive column for 2016 reflect the value of long-term incentive awards with a performance period ending in 2016 (i.e. the PSP awards granted in 2014), which the Remuneration Committee determined in February 2017 had met the applicable performance targets. The awards are scheduled to vest in 2019 following the completion of a two-year holding period. For the purposes of this table, the value of these awards (including accrued dividend equivalents) has been estimated using a share price of €30.97, being the three-month average share price to 31 December 2016. Amounts in the long-term incentive column for 2015 reflect the value of PSP and share option awards granted in 2013, which the Remuneration Committee determined in 2015 had met the applicable performance targets. For the purposes of this table, the awards have been valued based on the market value of the shares on the respective date of vesting, which was €24.50 in the case of the 2013 PSP award and €25.11 in the case of the 2013 options, less, in the case of the 2013 options, the total exercise cost.

## Directors' Remuneration Report - continued

### Structure of Directors' Remuneration Report

This report, including the Committee Chairman's introduction on pages 72 and 73, sets out details of:

- the Directors' Remuneration Policy, which was approved by shareholders at the 2016 AGM;
- the key areas of focus for the Remuneration Committee during 2017;
- the remuneration paid to Directors in respect of 2017;
- how the Policy will operate for 2018; and
- other areas of disclosure

The Directors' Remuneration Report, excluding the Summary of Directors' Remuneration Policy on pages 76 to 83, will be put to shareholders for the purposes of an advisory vote at the AGM to be held on 26 April 2018.

### The Remuneration Committee

The Remuneration Committee consists of five non-executive Directors considered by the Board to be independent. They bring the range of experience of large organisations and public companies, including experience in the area of senior executive remuneration, to enable the Committee to fulfil its role. Their biographical details are set out on pages 60 and 61. A schedule of attendance at Committee meetings is set out in table 7 on page 69.

The main focus of the Committee is to:

- determine and agree with the Board the Group's policy on executive remuneration;
- seek shareholder approval for the policy at least every three years;
- ensure that CRH's remuneration structures are fair and responsible; and

- consider and approve salaries and other terms of the remuneration packages for the executive Directors and the Chairman

In addition, the Committee:

- recommends and monitors the level and structure of remuneration for the executive Directors and senior management; and
- oversees the preparation of this Directors' Remuneration Report

In considering remuneration levels for executive Directors particularly, the Committee takes into account remuneration trends across the CRH Group, which has a diverse range of operations in 32 countries, in geographic regions which are often at different stages in the economic cycle. Annually, the Chairman of the Remuneration Committee reviews with the Audit Committee the Group's remuneration structures from a risk perspective.

### Summary of Directors' Remuneration Policy

CRH's Remuneration Policy is available on the Group's website, [www.crh.com](http://www.crh.com), and was included in full in the 2015 Annual Report. As the Company is not seeking shareholder approval for any revision to the Policy in 2018, the full text has not been reproduced in this report. The following paragraphs and tables 18 to 22 on pages 78 to 83 provide a summary of the key elements of the Policy.

As an Irish incorporated company, CRH is not required to comply with section 439A of the UK Companies Act 2006 which requires UK companies to submit their remuneration policy to a binding shareholder vote.

Maintaining high levels of corporate governance is important to CRH and,

therefore, the Company intends to operate within the Policy unless it is not practical to do so in exceptional circumstances. As an Irish incorporated company, CRH cannot rely on the statutory provisions applicable to UK companies under the 2013 UK Regulations which, in certain circumstances, can resolve any inconsistency between a remuneration policy and any contractual or other right of a Director. In the event there was to be such an inconsistency, the Company may be obliged to honour any such right, notwithstanding it may be inconsistent with the Policy.




The Remuneration Committee's aim is to make sure that CRH's pay structures are fair, responsible and competitive, in order that CRH can attract and retain staff of the calibre necessary for it to compete in all of its markets.


The Group's remuneration structures are designed to drive performance and link rewards to responsibility and the individual contribution of executives. It is policy to grant participation in the Group's performance-related plans to key management to encourage identification with shareholders' interests and to create a community of interest among different regions and nationalities.

In setting remuneration levels, the Remuneration Committee takes into consideration the remuneration practices of other international companies of similar size and scope and trends in executive remuneration generally, in each of the regions in which the Company operates. The Remuneration Committee also takes into account the European Union Commission's recommendations on remuneration in listed companies.


### CRH's Approach to Remuneration

The purpose of the Policy is to:

-  **Attract and retain** Directors of the highest calibre
-  Properly **reward and motivate** executive Directors to perform in the long-term interests of the shareholders
-  Provide an appropriate **blend of fixed and variable** remuneration and **short and long-term** incentives for executive Directors

 **Foster entrepreneurship** in regional companies by rewarding the creation of shareholder value through organic and acquisitive growth

 **Reflect the spread of the Group's operations** so that remuneration packages in each geographical area are appropriate and competitive for that area

 Reflect the **risk** policies of the Group



Concrete samples being tested for water resistance in the Concrete Lab at Podilsky Cement in the Ukraine. Podilsky has been part of CRH's Europe Heavyside Division since 1999 and is one of the largest and most modern dry process cement producers in Europe.

## Directors' Remuneration Report - continued

### Summary of Directors' Remuneration Policy - continued

The purpose, operation, opportunity and performance measures for the five components of executive Directors' remuneration are summarised in table 18 below. Further details and explanatory notes are included in the

full Policy, a copy of which is available on the CRH website, [www.crh.com](http://www.crh.com). The components of remuneration comprise three fixed elements: basic salary, pension and benefits, and two variable elements: annual bonus and PSP.

Details regarding the implementation of the Policy in 2017 can be found on pages 84 to 93 of the Annual Report on Remuneration.

#### Policy for Executive Directors

Table 18

Element	Fixed Base Salary	Fixed Pension
<b>Purpose and link to strategy</b>	<ul style="list-style-type: none"> <li>Competitive salaries help to attract and retain staff with the experience and knowledge required to enable the Group to compete in its markets</li> </ul>	<ul style="list-style-type: none"> <li>Pension arrangements provide competitive and appropriate retirement plans</li> <li>Given the long-term nature of the business, pension is an important part of the remuneration package to support creation of value and succession planning</li> </ul>
<b>Operation</b>	<ul style="list-style-type: none"> <li>Base salaries are set by the Committee taking into account:                             <ul style="list-style-type: none"> <li>the size and scope of the executive Director's role and responsibilities;</li> <li>the individual's skills, experience and performance;</li> <li>salary levels at FTSE listed companies of a similar size and complexity to CRH and other international construction and building materials companies; and</li> <li>pay and conditions elsewhere in the Group</li> </ul> </li> <li>Base salary is normally reviewed annually with changes generally effective on 1 January, although the Committee may make an out-of-cycle increase if it considers it to be appropriate</li> </ul>	<ul style="list-style-type: none"> <li>Ireland-based executive Directors can participate in a defined contribution scheme, or in certain circumstances can opt for a taxable, non-pensionable, supplementary cash alternative in lieu of pension contributions. Ireland-based executive Directors who joined the Group prior to 31 December 2011 participate in a contributory defined benefit scheme which closed to new entrants on that date</li> <li>US-based executive Directors can participate in a defined contribution scheme and in an unfunded Supplemental Executive Retirement Plan (SERP)</li> <li>For new appointments to the Board the Committee may determine that alternative pension provisions will operate (for example a cash contribution). When determining pension arrangements for new appointments the Committee will give regard to existing entitlements, the cost of the arrangements, market practice and the pension arrangements received elsewhere in the Group</li> </ul>
<b>Maximum opportunity</b>	<ul style="list-style-type: none"> <li>Base salaries are set at a level which the Committee considers to be appropriate taking into consideration the factors outlined in the Operation row above</li> <li>While there is no maximum base salary, normally increases will be in line with the typical level of increase awarded to other employees in the Group, but may be higher in certain circumstances. These circumstances may include:                             <ul style="list-style-type: none"> <li>where a new executive Director has been appointed at a lower salary, higher increases may be awarded over an initial period as the executive Director gains in experience and the salary is moved to what the Committee considers is an appropriate positioning;</li> <li>where there has been a significant increase in the scope or responsibility of an executive Director's role or where an individual has been internally promoted, higher salary increases may be awarded; and</li> <li>where a larger increase is considered necessary to reflect significant changes in market practice</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>The entitlement of individuals participating in defined contribution schemes reflects the accumulated individual and matching company contributions paid into the schemes. At present no Ireland-based executive Directors are members of a defined contribution scheme</li> <li>For the two Ireland-based executive Directors on the Board during 2017 who joined the Group prior to 31 December 2011, the defined benefit pension is provided through an Irish-revenue approved retirement benefit scheme (the 'Scheme'). Accrued benefits for service to 31 December 2011 are based on pensionable salary and years of service as at that date (annual accrual of 1/60ths), with this tranche being revalued annually at the Consumer Price Index subject to a 5% ceiling. For service subsequent to that date a career-average revalued earnings system was introduced with each year of service being subject to annual revaluation on the same basis as outlined above. Ireland-based executive Directors have elected to cease accruing pensions benefits and to receive a supplementary taxable non-pensionable cash allowance in lieu of pension benefits foregone as a result of the pension cap (see page 92 for more details). These allowances are similar in value to the reduction in the Company's liability represented by the pension benefit foregone. Whilst there is no absolute maximum to the quantum of these payments they are calculated based on actuarial advice as the equivalent of the reduction in the liability the Company would otherwise have had under the Scheme in respect of each individual's benefits and spread over the term to retirement as annual compensation allowances</li> <li>US-based executive Directors can participate in a defined contribution retirement plan in respect of basic salary; and in addition can participate in a SERP also in respect of basic salary, to which contributions are made at an agreed rate (20%), offset by contributions made to the other retirement plan</li> </ul>
<b>Performance measure</b>	Not applicable	Not applicable

#### Policy for Executive Directors - continued

Element	Fixed Benefits
<b>Purpose and link to strategy</b>	<ul style="list-style-type: none"> <li>To provide a market-competitive level of benefits for executive Directors</li> </ul>
<b>Operation</b>	<ul style="list-style-type: none"> <li>The Committee's policy is to set benefit provision at an appropriate market-competitive level taking into account market practice, the level of benefits provided for other employees in the Group, the individual's home jurisdiction and the jurisdiction in which the individual is based</li> <li>Employment-related benefits include the use of company cars (or a car allowance), medical insurance for the Director and his/her family and life assurance</li> <li>In the event that the Chief Executive falls ill or is injured in such a way as which would constitute ill-health or disablement so that the Chief Executive could not work for a period of more than six months, in lieu of the early ill-health retirement provisions in the pension scheme which would otherwise operate in such cases, he shall be entitled to receive a disability salary of €1,000,000 per annum. Such payment would cease when the Chief Executive reaches age 60, returns to work or if the service agreement is terminated</li> <li>US-based executive Directors can also receive benefits in relation to club membership and short-term disability insurance</li> <li>Benefits may also be provided in relation to legal fees incurred in respect of agreeing service contracts, or similar agreements (for which the Company may settle any tax incurred by the executive Director) and a gift on retirement</li> <li>The Committee may remove benefits that executive Directors receive or introduce other benefits if it is considered appropriate to do so. The Company may also pay the tax due on benefits if it considers that it is appropriate to do so</li> <li>Executive Directors are eligible to participate in the Company's all-employee share schemes on the same terms as other employees. Executive Directors may also receive other benefits which are available to employees generally</li> <li>Relocation policy: where executive Directors are required to relocate to take up their role, the Remuneration Committee may determine that they should receive appropriate relocation and ongoing expatriate benefits. The level of such benefits would be determined based on individual circumstances taking into account typical market practice</li> </ul>
<b>Maximum opportunity</b>	<ul style="list-style-type: none"> <li>The level of benefit provided will depend on the cost of providing individual items and the individual's circumstances, and therefore the Committee has not set a maximum level of benefits</li> </ul>
<b>Performance measure</b>	Not applicable



## Directors' Remuneration Report - continued

### Summary of Directors' Remuneration Policy - continued

#### Policy for Executive Directors - continued

Table 18 - continued

Element	<i>Performance-related Incentive Annual Bonus</i>
<b>Purpose and link to strategy</b>	<ul style="list-style-type: none"> <li>The Annual Performance-related Incentive Plan is designed to reward the creation of shareholder value through operational excellence and organic and acquisitive growth. The Plan incentivises executive Directors to deliver Group and individual goals that support long-term value creation</li> <li>The deferred element of the Plan links the value of executive Directors' reward with the long-term performance of the CRH share price and aligns the interests of executive Directors with shareholders' interests</li> <li>'Malus' and clawback provisions enable the Company to mitigate risk</li> </ul>
<b>Operation</b>	<ul style="list-style-type: none"> <li>The Annual Performance-related Incentive Plan rewards executive Directors for meeting Company performance goals over a financial year of the Company. Targets are set annually by the Committee</li> <li>The annual bonus is paid in a mix of cash and shares (structured as a deferred share award)</li> <li>For 2018:               <ul style="list-style-type: none"> <li>75% of the bonus will be paid in cash; and</li> <li>25% will be paid in shares (deferred element)</li> </ul> </li> <li>In future years, the Committee may determine that a different balance between cash and shares is appropriate and adjust the relevant payments accordingly</li> <li>When assessing performance and determining bonus payouts the Committee also considers the underlying financial performance of the business to ensure it is consistent with the overall award level</li> <li>The deferred element of the bonus will be structured as a conditional share award or nil-cost option and will normally vest after three years from grant (or a different period determined by the Committee). Deferred share awards may be settled in cash</li> <li>Dividend equivalents may be paid on deferred share awards in respect of dividends paid during the vesting period. These payments may be made in cash or shares and may assume the reinvestment of dividends on a cumulative basis</li> <li>For deferred awards, 'malus' provisions apply. Cash bonus payments are subject to clawback of the net amount paid for a period of three years from payment</li> </ul>
<b>Maximum opportunity</b>	<ul style="list-style-type: none"> <li>Maximum annual opportunity of 225% of base salary</li> <li>For 2018, the intended maximum award levels are:               <ul style="list-style-type: none"> <li>225% of base salary for Chief Executive; and</li> <li>150% of base salary for Finance Director. The Committee may increase the percentage in the future up to a maximum of 225%</li> </ul> </li> </ul>
<b>Performance measure</b>	<ul style="list-style-type: none"> <li>The Annual Performance-related Incentive Plan is based on achieving clearly defined and stretching annual targets and strategic goals set by the Committee each year based on key business priorities</li> <li>The performance metrics used are a mix of financial targets including return goals and personal/strategic objectives generally. Currently 80% of the bonus is based on financial performance measures. The Committee may vary the weightings of measures but no less than 50% shall be based on financial performance measures</li> <li>A portion of the bonus metrics for any Director may be linked to his/her specific area of responsibility</li> <li>Up to 50% of the maximum bonus will be paid for achieving target levels of performance</li> </ul>

#### Policy for Executive Directors - continued

Element	<i>Performance-related Incentive Performance Share Plan (PSP)</i>
<b>Purpose and link to strategy</b>	<ul style="list-style-type: none"> <li>The purpose of the PSP is to align the interest of key management across different regions and nationalities with those of shareholders through an interest in CRH shares and by incentivising the achievement of long-term performance goals</li> <li>'Malus' provisions enables the Company to mitigate risk</li> </ul>
<b>Operation</b>	<ul style="list-style-type: none"> <li>Awards (in the form of conditional share awards or nil-cost options) normally vest based on performance over a period of not less than three years. Awards may also be settled in cash</li> <li>Awards are normally subject to an additional holding period ending on the fifth anniversary of the grant date (or another date determined by the Committee)</li> <li>Dividend equivalents may be paid on PSP awards that vest in respect of dividends paid during the vesting period until the end of the holding period. These payments may be made in cash or shares and may assume reinvestment on a cumulative basis</li> <li>'Malus' provisions (as set out in the rules of the 2014 Performance Share Plan) will apply to awards</li> </ul>
<b>Maximum opportunity</b>	<ul style="list-style-type: none"> <li>Maximum annual opportunity of up to 365% of salary</li> <li>For 2018 the intended award levels are:               <ul style="list-style-type: none"> <li>365% of base salary for Chief Executive; and</li> <li>225% of base salary for Finance Director. The Committee may increase the percentage in the future up to a maximum of 365%</li> </ul> </li> </ul>
<b>Performance measure</b>	<ul style="list-style-type: none"> <li>Awards to be granted in 2018 will vest based on a relative TSR test compared to a tailored group of key peers (25%) and an index comparator (25%), and cumulative cash flow performance (50%) (see page 93 for details in relation to the 2018 awards)</li> <li>For threshold levels of performance, 25% of the award vests</li> <li>Where applicable, when determining vesting under the PSP the Committee reviews whether the TSR performance has been impacted by unusual events and whether it reflects the underlying performance of the business. In addition, the Committee considers financial performance (including RONA) in the period to ensure that TSR performance is consistent with the objectives of the performance criteria and was not distorted by extraneous factors</li> <li>The Committee may in future years change performance measures including introducing additional performance measures for awards made under this Policy, for example, returns-based measures</li> <li>The Committee may amend the performance conditions if an event occurs that causes it to consider that an amended performance condition would be more appropriate and would not be materially less difficult to satisfy</li> </ul>

## Directors' Remuneration Report - continued

### Summary of Directors' Remuneration Policy - continued

#### Remuneration outcomes in different performance scenarios

Remuneration at CRH consists of fixed pay (salary, pension and benefits), short-term variable pay and long-term variable pay. A significant portion of executive Directors' remuneration is linked to the delivery of key business goals over the short and long-term and the creation of shareholder value.

Table 21 shows hypothetical values of the remuneration package for executive Directors under three assumed performance scenarios.

No share price growth or the payment of dividend equivalents has been assumed in these scenarios. Potential benefits under all-employee share schemes have not been included.

Remuneration outcomes in different performance scenarios **Table 19**

Performance scenario	Payout level
Minimum	<ul style="list-style-type: none"> <li>Fixed pay (see table 20 for each executive Director)</li> <li>No bonus payout</li> <li>No vesting under the Performance Share Plan</li> </ul>
On-target performance	<ul style="list-style-type: none"> <li>50% annual bonus payout (112.5% of salary for the Chief Executive and 75% for the Finance Director)</li> <li>25% vesting under the Performance Share Plan (91.25% of salary for the Chief Executive and 56.25% for the Finance Director)</li> </ul>
Maximum performance	<ul style="list-style-type: none"> <li>100% annual bonus payout (225% of salary for the Chief Executive and 150% of salary for the Finance Director)</li> <li>100% Performance Share Plan vesting (365% of salary for the Chief Executive and 225% for the Finance Director)</li> </ul>

#### Hypothetical remuneration values

**Table 20**

	Salary With effect from 1 January 2018	Benefits Level paid in 2017 <sup>(i)</sup>	Estimated Pension <sup>(ii)</sup>	Total Fixed Pay
Chief Executive (Albert Manifold)	€1,485,260	€35,000	€743,000	€2,263,260
Finance Director (Senan Murphy)	€775,000	€25,000	€193,750	€993,750

(i) Based on 2017 expenses.

(ii) See page 92 for details in relation to retirement benefit arrangements.

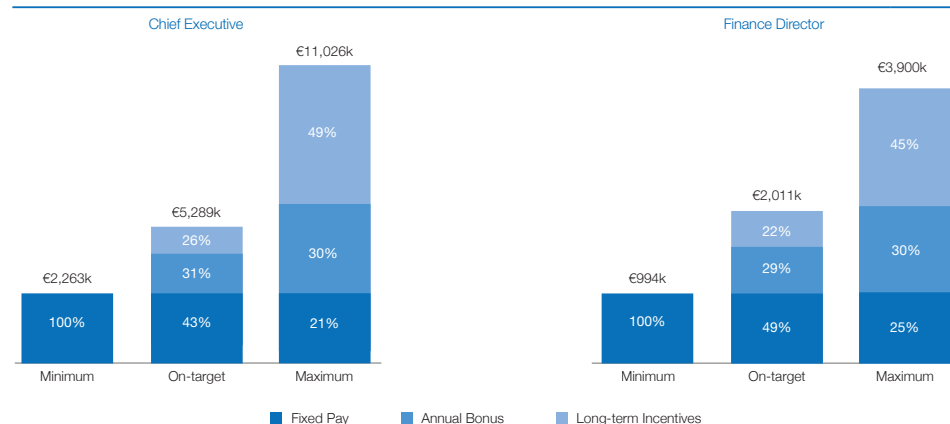
#### Policy for Non-Executive Directors

**Table 22**

Approach to setting fees	Basis of fees	Other items
<ul style="list-style-type: none"> <li>The remuneration of non-executive Directors is determined by a Board committee of the Chairman and the executive Directors</li> <li>The Remuneration Committee determines the remuneration of the Chairman within the framework or broad policy agreed with the Board</li> <li>Remuneration is set at a level which will attract individuals with the necessary experience and ability to make a substantial contribution to the Company's affairs and reflect the time and travel demands of Board duties</li> <li>Fees are set taking into account typical practice at other companies of a similar size and complexity to CRH</li> <li>Fees are reviewed at appropriate intervals</li> </ul>	<ul style="list-style-type: none"> <li>Fees are paid in cash</li> <li>Non-executive Director fees policy is to pay:                             <ul style="list-style-type: none"> <li>a basic fee for membership of the Board;</li> <li>an additional fee for chairing a Committee;</li> <li>an additional fee for the role of Senior Independent Director (SID) (if the SID is not the Chairman of the Remuneration Committee);</li> <li>an additional fee to reflect committee work (combined fee for all committee roles); and</li> <li>an additional fee based on the location of the Director to reflect time spent travelling to Board meetings</li> </ul> </li> <li>Other fees may also be paid to reflect other Board roles or responsibilities</li> <li>In accordance with the Articles of Association, shareholders set the maximum aggregate amount of the fees payable to non-executive Directors. The current limit of €875,000 was set by shareholders at the AGM held in 2016</li> </ul>	<ul style="list-style-type: none"> <li>The non-executive Directors do not participate in any of the Company's performance-related incentive plans or share schemes</li> <li>Non-executive Directors do not receive pensions</li> <li>The Group Chairman is reimbursed for expenses incurred in travelling from his residence to his CRH office. The Company settles any tax incurred on this on his behalf</li> <li>Non-executive Directors do not currently receive any benefits. However, benefits may be provided in the future if, in the view of the Board (for non-executive Directors or for the Chairman), this was considered appropriate. The Company may settle any tax due on benefits</li> </ul>

#### Performance-related remuneration outcomes

**Table 21**







## Directors' Remuneration Report - continued

### Annual Report on Remuneration

#### Remuneration received by executive Directors in respect of 2017

Details of individual remuneration for executive Directors for the year ended 31 December 2017, including explanatory notes, are given in table 17 on page 75. Details of Directors' remuneration charged against profit in the year are given in table 40 on page 95.

#### 2017 Annual Bonus Plan

CRH's Annual Bonus Plan for 2017 was based on a combination of financial targets and personal/strategic goals. The relative weighting of the components of the plan, together with indicative performance for each measure is given in table 23 on page 85. The performance by the Group in 2017 translated to annual bonus payouts of between 90% and 96% of maximum. Specific financial targets for the 2017 Annual Bonus Plan have not been disclosed in this report as they are considered by the Board to be commercially sensitive. However, it is intended that Group-related financial targets for 2017 will be disclosed in the 2018 Directors' Remuneration Report, subject to the information no longer being commercially sensitive at that time.

Details of each executive Director's personal/strategic objectives and their achievement against these objectives are set out in table 24 on page 85, with total bonus payments of 216% of salary for Albert Manifold, 135% of salary for Maeve Carton (pro-rated for service from 1 January to her retirement on 31 August 2017) and 144% of salary for Senan Murphy representing a percentage against the maximum payable of 96%, 90% and 96% respectively.

In accordance with the Policy, 25% of the bonus amounts for Albert Manifold and Senan Murphy will be deferred into shares for a period of three years. Deferred Share awards are not subject to any additional performance conditions during the deferral period and are adjusted for dividend equivalents based on dividends paid by CRH during the deferral period. Annual bonus awards are subject to recovery provisions for three years from the date of payment (cash awards) or grant (deferred awards).

Following her retirement in 2017, the Remuneration Committee has determined that the 2017 bonus for Maeve Carton will be paid entirely in cash.

#### 2016 Annual Bonus – Retrospective Disclosure of Targets

Similar to 2017, CRH's Annual Bonus Plan for 2016 was based on a combination of financial targets and personal/strategic goals. Due to commercial sensitivity, specific targets were not disclosed in the 2016 Directors' Remuneration Report. The Remuneration Committee considers that Group-related targets for 2016 have ceased to be commercially sensitive and, accordingly, these are set out in table 25 on page 85.

#### Long-term Incentives

##### Performance Share Plan (the 'PSP')

##### 2015 awards

In 2015, the executive Directors were granted conditional awards under the 2014 PSP. The awards were based on TSR (75% of the award) and Cumulative Cash Flow (25% of the award), and performance was measured over the three-year period 1 January 2015 to 31 December 2017. Based on performance, 53.7% out of 75% will vest in respect of the TSR element, and 25% out of 25% will vest in respect of the Cumulative Cash Flow element (resulting in an overall vesting level for the 2015 awards of 78.7%). The Committee considers that the vesting outcome is reflective of the Company's underlying performance over the performance period. In accordance with the Policy, the 2015 awards to executive Directors will vest in 2020 on completion of an additional two-year holding period. Vested awards will be adjusted for dividend equivalents based on dividends in the period from grant to the date of vesting in 2020. Table 26 on page 86 sets out the relevant targets. Table 28 on page 86 sets out details of the awards.

##### 2017 awards

During 2017 awards under the PSP were made to the executive Directors, details of which are summarised in table 31 on page 87. 50% of each award made in 2017 is subject to a TSR measure, with 25% being measured against a tailored sector peer group (see table

30 on page 87) and 25% against the FTSE All-World Construction & Materials Index (as at the start of the relevant performance period). Given the importance of returns-based measures to a number of our shareholders, the TSR measure will be subject to a RONA underpin. At the end of the three-year performance period, the Remuneration Committee will consider the RONA performance of the business and the outcome for the TSR element may be adjusted (downwards only) if RONA performance has not met the expectations of the Board and the Remuneration Committee. The other 50% of each award made in 2017 is subject to a cumulative cash flow metric. The definition of cash flow is the net increase/decrease in cash and cash equivalents adjusted to exclude:

- dividends to shareholders;
- acquisition/investment expenditure;
- proceeds from divestments;
- share issues (scrip dividend, share options, other);
- financing cash flows (new loans/ repayments);
- back funding pension payments; and
- foreign exchange translation

The Remuneration Committee considers that it is appropriate to make these adjustments in order to remove items that do not reflect the quality of management's operational performance, or are largely outside of management control. The Remuneration Committee will also consider whether any adjustments are required to cash flows, for example, resulting from any significant acquisitions completed during the performance period or a significant underspend or delay in budgeted capital expenditure, both ordinary and extraordinary.

Performance for the awards made in 2017 will be assessed over the three-year period to 31 December 2019. Details of the performance targets are set out in table 29 on page 87. Awards, to the extent that they vest, will be adjusted for dividend equivalents based on dividends in the period from grant to the date of vesting in 2022. 'Malus' provisions apply to the awards.

### Annual Bonus Plan - 2017

#### 2017 Annual Bonus - Achievement - Financial Targets (i)

Table 23

Measure	Weighting	Performance achieved relative to targets (ii)			Performance Achieved	Percentage of Maximum Awarded
		Threshold	Target	Maximum		
CRH EPS	25%				166.2c (iv)	25%
CRH Cash Flow (iii)	30%				€2,234m	30%
CRH RONA	25%				10.3% (iv)	24%
Personal/Strategic	20%				See table 24	11%-17%
<b>Total</b>	<b>100%</b>					<b>90%-96%</b>

(i) Due to commercial sensitivity, 2017 targets will be disclosed in the 2018 Directors' Remuneration Report.

(ii) 0% of each element is earned at threshold, 50% at target and 100% at maximum, with a straight-line payout schedule between these points.

(iii) For the purpose of the annual bonus, operating cash flow has been defined as reported internally. The figure differs from the net cash inflow from operating activities of €2,189 million reported in the Consolidated Statement of Cash Flows, primarily because it is calculated after deducting cash outflows on the purchase of property, plant and equipment (PP&E), net of proceeds for the disposal of PP&E, and before deducting interest and tax payments.

(iv) Reported EPS and RONA have been adjusted by the Remuneration Committee to exclude one-off benefits.

#### 2017 Annual Bonus - Achievement - Personal/Strategic Targets

Table 24

Directors	Weighting	Achievements	Percentage of Maximum Awarded
Albert Manifold	20%	Good progress in relation to the continued development of the Group Leadership team; effective leadership for the Group's talent management process with a particular focus on management succession for senior leadership roles; ongoing co-ordination of the assessment of strategic alternatives for the Group; ensuring alignment of CRH's organisation structure with evolving strategy.	17%
Maeve Carton	20%	Continued development of the Group's regulatory, ethics and compliance functions; responsibility for the roll out of CRH's IT security strategy and ensuring a cross-Group approach to cyber and information security; supporting Internal Audit in relation to the development of an updated strategy; the development of a medium-term strategy for Investor Relations, including the establishment of new offices.	11%
Senan Murphy	20%	Supporting the development and application of strategic initiatives for key lines of business; providing an increased focus on talent management across the finance function for new and existing roles and continued development of succession planning processes; sponsorship of a Group project initiative in relation to the use of CRH branding by operating entities; continued maintenance of a strong risk and control environment; effective management of relations with investors, banks, rating agencies and other key stakeholders.	17%

### Annual Bonus Plan - 2016

#### 2016 Annual Bonus - Achievement - Financial Targets (i)

Table 25

Measure	Weighting	Performance needed for payout at			Performance Achieved	Percentage of Maximum Awarded
		Threshold	Target	Maximum		
CRH EPS	25%	76.7c	83.4c	87.6c	150.2c	25%
CRH Cash Flow (ii)	30%	€1,782m	€1,937m	€2,034m	€2,444m	30%
CRH RONA	25%	6.2%	6.7%	7.2%	9.7%	25%

(i) Due to commercial sensitivity, 2016 bonus targets were not disclosed in the 2016 Directors' Remuneration Report.

(ii) For the purpose of the annual bonus, operating cash flow has been defined as reported internally. The figure differs from the net cash inflow from operating activities of €2,340 million reported in the 2016 Consolidated Statement of Cash Flows, primarily because it is calculated after deducting cash outflows on the purchase of property, plant and equipment (PP&E), net of proceeds for the disposal of PP&E, and before deducting interest and tax payments.

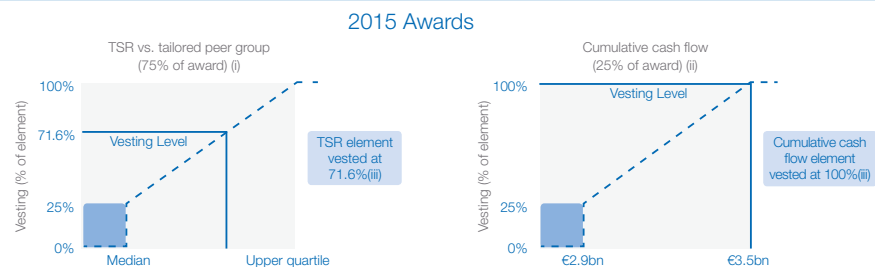


# Directors' Remuneration Report - continued

## Long-Term Incentives - Awards 2015

### Performance Share Plan Metrics

Table 26



(i) The methodology for calculating TSR assumes all dividends are reinvested on the ex-dividend date at the closing share price on that day; the open and close price is based on the three-month average closing price on the last day before the start of the performance period and the final day of the performance period respectively.

(ii) See page 84 for further information on how cash flow is calculated for 2016, 2017 and 2018 awards.

(iii) For the purposes of the 2015 Award, TSR performance was in the 66th percentile against the tailored peer group (see table 27 below) and the cumulative cash flow for the three years to end 31 December 2017 was €4.8 billion.

### Peer Group for TSR Performance Metric for PSP Awards in 2015

Table 27

Boral	Heidelberg Cement	Martin Marietta Materials	Vulcan Materials
Buzzi Unicem	Italcementi	Holcim	Travis Perkins
Cemex	Kingspan Group	Saint Gobain	Wienerberger
Grafton Group	Lafarge	Titan Cement	Ferguson (formerly Wolseley)

### 2015 PSP Award - Vesting Details

Table 28

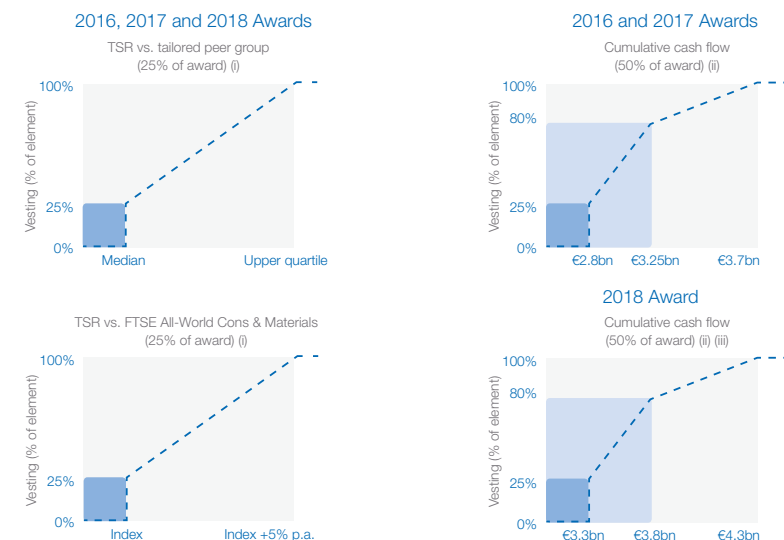
Executive Director	Interests Held	Vesting Outcome (% of max)	Interests Due to Vest	Date of Vesting	Assumed Share Price (i)	Estimated Value
Albert Manifold	141,531	78.7%	111,385	March 2020	€30.42	€3,388,329
Maeve Carton	59,246	78.7%	46,627	March 2020	€30.42	€1,418,381

(i) As the share price on the date of vesting is not yet known, for the purposes of this table, the value of these awards, which were subject to a three-year performance period ending in 2017, has been estimated using a share price of €30.42, being the three-month average share price to 31 December 2017.

## Long-Term Incentives - Awards in 2016, 2017 and 2018

### Performance Share Plan Metrics

Table 29



(i) and (ii) see footnotes to table 26.

(iii) the cumulative cash flow target for the 2018 award includes the impact of the Ash Grove acquisition, the conclusion of which is subject to regulatory approval.

### Peer Group for TSR Performance Metric for PSP Awards in 2016, 2017 and 2018

Table 30

ACS	Braas Monier	LafargeHolcim	Skanska	Vinci
Boral	Cemex	Rockwool	Titan Cement	Wienerberger
Buzzi Unicem	Heidelberg Cement	Saint Gobain	Vicat	

### 2017 PSP Award Details

Table 31

Executive Director	Date of Grant	Number of Shares	Market Price on which Award was Based	Face Value at Date of Award	Face Value at Date of Award (% of salary)
Albert Manifold	6 March 2017	163,254	€32.24	€5,263,309	365%
Maeve Carton	6 March 2017	43,779	€32.24	€1,411,435	200%
Senan Murphy	6 March 2017	43,779	€32.24	€1,411,435	200%



## Directors' Remuneration Report - continued

### Summary of Outstanding Share Incentive Awards (Audited)

Table 32

	Year of Award	Performance Period	Release Date	Market Value at Date of Award	Exercise Price	Balance at 31 December 2016
<b>Albert Manifold</b>						
Annual Bonus Plan (Deferred Share Awards) (i)	2015	01/01/2014 - 31/12/2014	2018	€18.05	n/a	24,928
	2016	01/01/2015 - 31/12/2015	2019	€25.60	n/a	18,900
	2017	01/01/2016 - 31/12/2016	2020	€30.97	n/a	-
2014 Performance Share Plan (ii)	2014	01/01/2014 - 31/12/2016	2019	€20.49	n/a	142,900
	2015	01/01/2015 - 31/12/2017	2020	€24.42	n/a	132,064
	2016	01/01/2016 - 31/12/2018	2021	€24.56	n/a	208,104
2010 Savings-Related Share Option Scheme	2017	01/01/2017 - 31/12/2019	2022	€32.24	n/a	-
	2012	n/a	2017	n/a	€13.64	2,236
	2017	n/a	2022	n/a	€27.86	-
<b>Maeve Carton</b>						
Annual Bonus Plan (Deferred Share Awards) (i)	2015	01/01/2014 - 31/12/2014	2018	€18.05	n/a	12,983
	2016	01/01/2015 - 31/12/2015	2019	€25.60	n/a	9,560
	2017	01/01/2016 - 31/12/2016	2020	€30.97	n/a	-
2014 Performance Share Plan (ii)	2014	01/01/2014 - 31/12/2016	2019	€20.49	n/a	59,500
	2015	01/01/2015 - 31/12/2017	2020	€24.42	n/a	55,283
	2016	01/01/2016 - 31/12/2018	2021	€24.56	n/a	56,078
2010 Savings-Related Share Option Scheme	2017	01/01/2017 - 31/12/2019	2022	€32.24	n/a	-
	2014	n/a	2019	n/a	€17.67	1,726
<b>Senan Murphy</b>						
Annual Bonus Plan (Deferred Share Awards) (i)	2017	01/01/2016 - 31/12/2016	2020	€30.97	n/a	-
2014 Performance Share Plan (ii)	2016	01/01/2016 - 31/12/2018	2021	€24.56	n/a	50,906
	2017	01/01/2017 - 31/12/2019	2022	€32.24	n/a	-

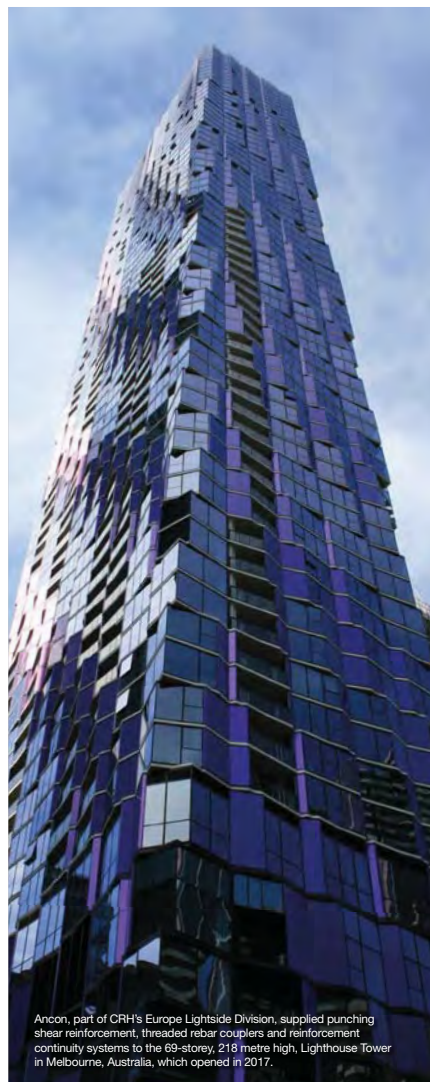
	Granted in 2017	Vested in 2017	Exercised in 2017	Lapsed in 2017	Balance at 31 December 2017	Dividends Awarded & Vested	Market Value on Date of Exercise/Vesting
	-	-	-	-	24,928	-	-
	-	-	-	-	18,900	-	-
	25,007	-	-	-	25,007	-	-
	-	-	-	-	142,900	-	-
	-	-	-	-	132,064	-	-
	-	-	-	-	208,104	-	-
	163,254	-	-	-	163,254	-	-
	-	-	2,236	-	-	-	€30.80
	1,085	-	-	-	1,085	-	-
	-	12,983	-	-	-	928	€31.45
	-	9,560	-	-	-	433	€31.45
	8,060	8,060	-	-	-	165	€31.45
	-	-	-	-	59,500	-	-
	-	-	-	-	55,283	-	-
	-	-	-	-	56,078	-	-
	43,779	-	-	-	43,779	-	-
	-	-	-	-	1,726	-	-
	7,316	-	-	-	7,316	-	-
	-	-	-	-	50,906	-	-
	43,779	-	-	-	43,779	-	-

The market price of the Company's shares at 31 December 2017 was €29.96 and the range during 2017 was €28.48 to €34.53.

(i) Dividend equivalents accrue on Deferred Share Bonus Awards under the Remuneration Policy. Such dividend equivalents will be released to participants on the date of release of the Deferred Shares. As outlined on page 74, following her retirement on 31 August 2017, all deferred share awards granted to Maeve Carton were released to her on 3 November 2017.

(ii) Dividend equivalents accrue on awards made under the 2014 Performance Share Plan under the Remuneration Policy. Subject to satisfaction of the applicable performance criteria, such dividend equivalents will be released to participants in the form of additional shares on vesting.

## Directors' Remuneration Report - continued



Ancon, part of CRH's Europe Lightside Division, supplied punching shear reinforcement, threaded rebar couplers and reinforcement continuity systems to the 69-storey, 218 metre high, Lighthouse Tower in Melbourne, Australia, which opened in 2017.

### Shareholdings of Directors and Company Secretary Table 33

Name	Beneficially Owned (i)	
	31 December 2016	31 December 2017
<b>Executive Directors</b>		
A. Manifold	76,597	20,170
S. Murphy	1,021	1,039
<b>Non-executive Directors</b>		
N. Hartery	16,987	17,309
P.J. Kennedy	2,000	2,000
D.A. McGovern, Jr. (ii)	5,375	5,481
H.A. McSharry	4,043	4,111
G.L. Platt (iii)	-	1,019
L.J. Riches	2,000	5,000
H.Th. Rottinghuis	15,645	1,000
W.J. Teuber, Jr. (ii)	1,000	1,000
<b>Company Secretary</b>		
N. Colgan	9,993	10,416
<b>Total</b>	<b>134,661</b>	<b>68,545</b>

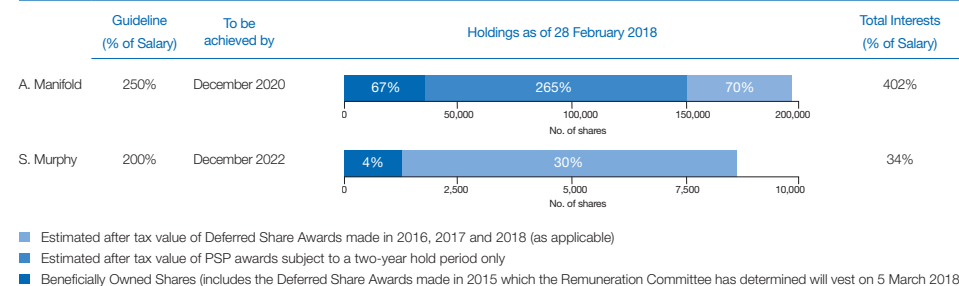
(i) Excludes awards of Deferred Shares, details of which are disclosed on pages 88 and 89. The Directors and Company Secretary do not have any special voting rights.

(ii) Holdings in the form of American Depositary Receipts (ADRs).

(iii) Appointed with effect from 1 January 2017. Gillian Platt did not have a holding of CRH shares on her appointment.

There were no transactions in the above Directors' and Secretary's interests between 31 December 2017 and 28 February 2018.

### Executive Director Shareholdings as a % of 2018 base salary (i) Table 34



(i) For the purposes of this table, the interests have been valued using the three-month average share price to 31 December 2017 (€30.42).

### Non-executive Directors

#### Individual remuneration for the year ended 31 December 2017 (Audited) Table 35

	Basic salary and fees (i) €000		Benefits (ii) €000		Other remuneration (iii) €000		Total €000		
	2017	2016	2017	2016	2017	2016	2017	2016	2015
<b>Non-executive Directors</b>									
E.J. Bärtschi (iv)	78	78	-	-	81	81	159	159	139
W.P. Egan (v)	-	26	-	-	-	19	-	45	120
U-H. Felcht (v)	-	26	-	-	-	14	-	40	105
N. Hartery	78	78	1	7	512	512	591	597	456
P.J. Kennedy	78	78	-	-	42	42	120	120	105
R. McDonald (vi)	-	59	-	-	-	43	-	102	40
D.A. McGovern, Jr.	78	78	-	-	96	96	174	174	153
H.A. McSharry	78	78	-	-	42	42	120	120	90
G.L. Platt (vii)	78	-	-	-	53	-	131	-	-
L.J. Riches (viii)	78	78	-	-	42	42	120	120	88
H.Th. Rottinghuis	78	78	-	-	42	42	120	120	105
W.J. Teuber, Jr. (ix)	78	65	-	-	57	47	135	112	-
	<b>702</b>	<b>722</b>	<b>1</b>	<b>7</b>	<b>967</b>	<b>980</b>	<b>1,670</b>	<b>1,709</b>	<b>1,401</b>

(i) Further information in relation to the non-executive Director fee structure is set out in table 37 on page 93.

(ii) Benefits: In the case of Nicky Hartery the amount reflects the reimbursement of travel expenses from his residence to his Chairman's office in Dublin, which have been grossed up for Irish tax purposes.

(iii) Other Remuneration: Includes remuneration for Chairman, Board Committee work and allowances for non-executive Directors based outside of Ireland.

(iv) Ernst Bärtschi resigned as a Director on 20 December 2017.

(v) Bill Egan and Utz Felcht retired as Directors on 28 April 2016.

(vi) Rebecca McDonald retired as a Director on 28 September 2016.

(vii) Gillian Platt became a Director on 1 January 2017.

(viii) Lucinda Riches became a Director on 1 March 2015.

(ix) Bill Teuber became a Director on 3 March 2016.



## Directors' Remuneration Report - continued

### Other employee share plans

Executive Directors are eligible to participate in the 2010 Savings-related Option Scheme (Republic of Ireland) (the '2010 SAYE Scheme') and in the Group's Irish Revenue approved Share Participation Scheme (the 'Participation Scheme').

The 2010 SAYE Scheme is an Irish Revenue approved plan open to all Irish employees. Participants may save up to €500 a month from their net salaries for a fixed term of three or five years and at the end of the savings period they have the option to buy CRH shares at a discount of up to 15% of the market price on the date of invitation of each savings contract. Details of the outstanding awards of executive Directors under the 2010 SAYE Scheme are set out in table 32 on pages 88 and 89.

The Participation Scheme is an Irish Revenue approved plan and is open to all employees in Ireland. Grants can be made to participants up to a maximum of €12,700 annually in CRH shares. Albert Manifold and Maeve Carton participated in the Participation Scheme in 2017.

### Retirement benefit expense

Albert Manifold and Maeve Carton are participants in a contributory defined benefit plan which is based on an accrual rate of 1/60th of salary\* for each year of pensionable service and is designed to provide two-thirds of career average salary at retirement for full service. Following her retirement in 2017, Maeve Carton will receive a deferred pension, payable from her Normal Retirement Age (60), based on the pension she accrued to her date of retirement. Albert Manifold will become entitled to a deferred pension, payable from Normal Retirement Age, if he leaves service

prior to Normal Retirement Age. The Finance Act 2006 established a cap on pension provisions by introducing a penalty tax charge on pension assets in excess of the higher of €5 million (in the Finance Act 2011, this threshold was reduced to €2.3 million and reduced further to €2 million by the Finance (No. 2) Act 2013) or the value of individual accrued pension entitlements as at 7 December 2005.

As a result of these legislative changes, the Remuneration Committee decided that executive Directors should have the option of continuing to accrue pension benefits as previously, or of choosing an alternative arrangement - by accepting pension benefits limited by the cap - with a similar overall cost to the Group. Albert Manifold and Maeve Carton have opted for an arrangement whereby their pensions are capped in line with the provisions of the Finance Act 2006 and receive a supplementary taxable non-pensionable cash supplement in lieu of pension benefits foregone. There was, therefore, no additional accrual in 2017. The cash pension supplements for 2017 are detailed in table 17 on page 75. In the case of Maeve Carton, the cash pension supplement for 2017 has been pro-rated for service in the period between 1 January 2017 and the date of her retirement in August 2017. These supplements are similar in value to the reduction in the Company's liability represented by the pension benefits foregone. They are calculated based on actuarial advice as the equivalent of the reduction in the Company's liability to each individual and spread over the term to retirement as annual compensation allowances.

The contributory defined benefit plan in which Albert Manifold and Maeve Carton participate closed to new entrants at the end of 2011.

Senan Murphy receives a taxable non-pensionable cash supplement equivalent to 25% of his annual base salary in lieu of a pension contribution.

Details regarding pension entitlements for the executive Directors are set out in table 36.

### Shareholding guidelines for executive Directors

Pursuant to the Policy, executive Directors are required to build up (and maintain) a minimum holding in CRH shares.

The shareholding guideline for the Chief Executive is 2.5 times basic salary. The Remuneration Committee has determined that the Chief Executive will have until 31 December 2020 to meet the guideline.

As outlined in the Chairman's introduction on pages 72 and 73, the shareholding guideline for the Finance Director has been increased from 1 times basic salary to 2 times basic salary. Following the increase, the Remuneration Committee has determined that the Finance Director will have until 31 December 2022 to meet the guideline.

The current shareholdings of executive Directors as a multiple of basic salary are shown in table 34 on page 91. The table includes, for illustrative purposes, shares beneficially owned by the executive Directors as at 28 February 2018 (which includes, in the case of the Chief Executive, the 2015 Deferred Share awards which the Remuneration Committee has determined will vest on 5 March 2018), the estimated after tax vesting of the 2014 and 2015 PSP awards, which will be released in 2019 and 2020 respectively, and the estimated after tax vesting of Deferred Share awards granted in respect of 2015, 2016 and 2017, as appropriate.

### Non-executive Director Fee Structure

Table 37

Role	2017
Group Chairman (including non-executive Director salary and fees for committee work)	€575,000
Basic non-executive Director fee	€78,000
Committee fee	€27,000
<b>Additional fees</b>	
Senior Independent Director/Remuneration Committee Chairman (i)	€39,000
Audit Committee Chairman	€39,000
Fee for Europe-based non-executive Directors	€15,000
Fee for US-based non-executive Directors	€30,000

(i) If the roles of Senior Independent Director and Remuneration Committee Chair are not combined, fees of €25,000 and €15,000 apply respectively.

### Non-executive Directors

The remuneration of non-executive Directors is determined by the Board of Directors as a whole. The fees were increased in 2016. Details of the remuneration paid to non-executive Directors in 2017 are set out in table 35 on page 91. There is no proposed change in fees for non-executive Directors for 2018. See table 37 for the current fee structure.

### Implementation of Remuneration Policy for 2018

#### Basic salary and benefits

Details of executive Directors' salaries for 2018 compared with 2017 are set out in the Committee Chairman's introduction on pages 72 and 73.

Executive Directors will receive benefits in line with the Policy in 2018. The level of benefits provided will depend on the cost of providing individual items and the individual circumstances.

#### 2018 Annual Bonus Plan

The Remuneration Committee has determined that the 2018 Annual Bonus Plan will be operated broadly in line with the 2017 Annual

Bonus Plan. 80% of the bonus will be based on financial targets and the remaining 20% on individual objectives aligned to key strategic areas for each executive Director (the metrics, weightings and opportunity under the 2018 Annual Bonus Plan are summarised in table 13 on page 73). The Committee intends to disclose the targets for the 2018 Annual Bonus Plan in the 2019 Directors' Remuneration Report.

#### 2018 PSP Awards

For the 2018 PSP awards, performance will be assessed over the three-year period to 31 December 2020. The metrics, weightings and opportunity for the 2018 PSP awards are summarised in table 13 on page 73.

As was the case in 2017, 50% of the 2018 awards will be subject to TSR performance, with 25% being measured against a tailored sector peer group (see table 30 on page 87) and 25% against the FTSE All-World Construction & Materials Index. Vesting between the threshold and maximum levels will be calculated on a straight-line basis. The TSR measure will also be subject to a RONA underpin.

For the cash flow measure, vesting is calculated on a straight-line basis between 25% and 80% for cash flow of between

€3.3 billion and €3.8 billion and between 80% and 100% for an outturn between €3.8 billion and €4.3 billion. The Remuneration Committee has reviewed the cash flow target in detail and is satisfied that the target for maximum payout represents a significant stretch. The target includes the impact of the Ash Grove acquisition, the conclusion of which is subject to regulatory approval. The Committee will consider whether adjustments are required to cash flows, for example, resulting from any significant acquisitions during the period.

#### Retirement Benefit Expense

No changes in pension arrangements are proposed in 2018.

### Pension Entitlements - Defined Benefit (Audited)

Table 36

Executive Directors	Increase in accrued personal pension during 2017 (i) €000	Transfer value of increase in dependants pension (i) €000	Total accrued personal pension at year-end (ii) €000
Albert Manifold	-	104	273
Maeve Carton	-	18	266

(i) As noted above, the pensions of Albert Manifold and Maeve Carton have been capped in line with the provisions of the Irish Finance Acts. However, dependants' pensions continue to accrue resulting in Greenbury transfer values which have been calculated on the basis of actuarial advice. These amounts do not represent sums paid out or due in 2017 in the event of these Directors leaving service.

(ii) The accrued pensions shown are those which would be payable annually from normal retirement date.



## Directors' Remuneration Report - continued

### Other Disclosures

#### Fees paid to former Directors

The 2013 Large and Medium-sized Companies and Groups (Accounts and Reports) (Amendment Regulations) Regulations in the UK, require disclosure of payments to former Directors in certain circumstances. No payments have been made to individual former Directors in those circumstances which exceed the de minimis threshold of €20,000 per annum set by the Remuneration Committee.

As reported in the 2016 Directors' Remuneration Report, following his retirement from the Board on 31 December 2016, the Remuneration Committee determined that Mark Towe's outstanding Deferred Share and PSP awards should be released to him at the applicable normal release dates. Accordingly, during 2017 2,772 shares were released to him in respect of his 2014 Deferred Share Award.

#### Executives' external appointments

The executive Directors may accept external appointments with the prior approval of the Board provided that such appointments do not prejudice the individual's ability to fulfil their duties at the Group. Whether any related fees are retained by the individual or remitted to the Group is considered on a case-by-case basis.

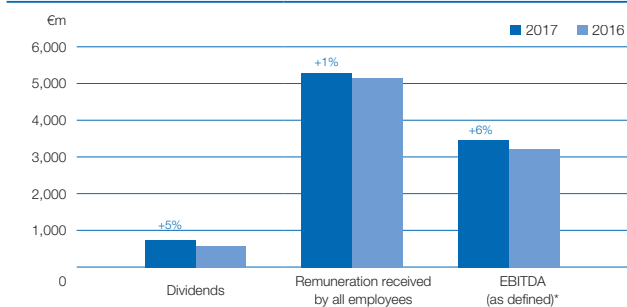
#### Total Shareholder Return

The value at 31 December 2017 of €100 invested in CRH in 2008, compared with the value of €100 invested in the Eurofirst 300 Index and the FTSE100 Index (which CRH joined in December 2011) is shown in table 14 on page 74.

TSR performance has been compared against the FTSE100 and the Eurofirst 300 as these are broad general market indices of

#### Relative Importance of Spend on Pay

Table 38



which CRH is a constituent. The Committee, therefore, considers that they offer a reasonable comparison for performance.

Compound TSR growth since the formation of the Group in 1970 (assuming the reinvestment of dividends) is 15.8%.

#### Remuneration paid to Chief Executive 2009 – 2017

Table 39 shows the total remuneration paid to the Chief Executive in the period 2009 to 2017 inclusive and shows bonuses and vested long-term incentive awards as a percentage of the maximum bonus and award that could have been received in respect of each year. Albert Manifold succeeded Myles Lee as Chief Executive in January 2014.

Excluding the impact of vested share-based awards and the non-taxable benefit associated with participation in the Group's savings-related share option scheme, the percentage change in the Chief Executive's

salary, benefits and bonus between 2016 and 2017 was as follows:

Salary	+3%
Benefits	+36%
Bonus	+1%

The combined percentage change was 2%.

There was a 1% increase in the total average employment costs in respect of employees in the Group as a whole between 2016 and 2017.

#### Relative Importance of Spend on Pay

Table 38 sets out the amount paid by the Group in remuneration to employees compared to dividend distributions made to shareholders in 2016 and 2017. We have also shown the change in EBITDA (as defined)\* performance year-on-year to provide an indication of the change in profit performance.

#### Remuneration Paid to Chief Executive - 2009 to 2017 inclusive

Table 39

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Single figure Remuneration (€m) (i)	€2.6m	€2.6m	€2.9m	€2.5m	€4.2m	€4.2m	€5.4m	€9.9m	€8.7m
Annual Bonus (% of max)	22%	21%	39%	28%	30%	100%	100%	98%	96%
Long-term incentive award vesting (% of max)	50%	46%	17%	0%	PSP: 49% LTIP: 34%	PSP: 0% Options: 75%	PSP: 78% Options: 37%	100%	79%

(i) Single figure remuneration comprises the total fixed pay, annual bonus and the value of long-term incentives vesting in respect of each year.

#### Advisers to the Remuneration Committee

Mercer Kepler, a brand of Mercer, are the Committee's independent remuneration consultants. The Committee has satisfied itself that the advice provided by Mercer Kepler is robust and independent and that the Mercer Kepler engagement partner and team that provide remuneration advice to the Committee do not have connections with CRH plc that may impair their independence.

Mercer Kepler are signatories to the Voluntary Code of Conduct in relation to executive remuneration consulting in the UK. During 2017, Mercer Kepler provided the following remuneration services:

- research and advice regarding remuneration trends, best practice and remuneration levels for executive and non-executive Directors in companies of similar size and complexity;
- advice in relation to remuneration matters generally; and
- attendance at Committee meetings, when required

In 2017, Mercer Kepler's parent, the MMC Group, provided pensions advice and related services to the Company. In 2017, the total fees paid to Mercer Kepler were Stg£62,000.

#### 2017 Annual General Meeting

The voting outcome in respect of the remuneration-related votes at the 2017 AGM is set out in table 15 on page 74. Further details in relation to the voting outcome are set out in the Committee Chairman's introduction on pages 72 and 73.

On behalf of the Board

**Donald A. McGovern, Jr.**

Chairman of Remuneration Committee

28 February 2018

#### Details of remuneration charged against profit in 2017

##### Directors' Remuneration (i) (Audited)

Table 40

	2017 €000	2016 €000	2015 €000
<b>Executive Directors</b>			
Basic Salary	2,618	4,023	3,245
Performance-related Incentive Plan - cash element	3,734	5,197	3,601
- deferred shares element	1,033	1,734	1,201
Retirement Benefits Expense	988	1,341	1,145
Benefits	78	128	104
<b>Total executive Directors' remuneration</b>	<b>8,451</b>	<b>12,423</b>	<b>9,296</b>
Average number of executive Directors	2.67	4.00	3.00
<b>Non-executive Directors</b>			
Fees	702	722	672
Other remuneration	967	980	794
Benefits	1	7	6
<b>Total non-executive Directors' remuneration</b>	<b>1,670</b>	<b>1,709</b>	<b>1,472</b>
Average number of non-executive Directors	9.00	9.24	9.75
Payments to former Directors (ii)	9	124	95
<b>Total Directors' remuneration</b>	<b>10,130</b>	<b>14,256</b>	<b>10,863</b>

(i) See analysis of 2017 remuneration by individual in tables 17 and 35 on pages 75 and 91 respectively.

(ii) Consulting and other fees paid to a number of former Directors.

For the purposes of Section 305 of the Companies Act 2014, the aggregate gains by Directors on the exercise of share options during 2017 was €38,370 (2016: €994,651).



# Directors' Report

The Directors submit their report and the audited Consolidated Financial Statements for the year ended 31 December 2017.

## Principal Activity, Results for the Year and Review of Business

CRH is a leading global diversified building materials group which manufactures and distributes a diverse range of products servicing the breadth of construction needs, from the fundamentals of heavy materials and elements to construct the frame, through value-added exterior products that complete the building envelope, to distribution channels which service construction fit-out and renewal. The Group has approximately 1,300 subsidiary, joint venture and associate undertakings; the principal ones as at 31 December 2017 are listed on pages 246 to 251.

The Group's strategy, business model and development activity are summarised on pages 10 to 13 and 25 to 29 and are deemed to be incorporated in this part of the Directors' Report.

As set out in the Consolidated Income Statement on page 120, the Group reported a profit before tax for the year of €1.87 billion. Comprehensive reviews of the financial and operating performance of the Group during 2017 are set out in the Business Performance section on pages 22 to 55; key financial performance indicators are also set out in this section and on pages 14 and 15.

The treasury policy and objectives of the Group are set out in detail in note 22 to the Consolidated Financial Statements

## Dividend

CRH's capital allocation policy reflects the Group's strategy of generating industry leading returns through value-accretive allocation of capital while delivering long-term dividend growth for shareholders. For the period 1984 to 2009 the Group maintained a progressive dividend policy delivering dividend growth in each of these years. The Group maintained the dividend at 62.5c per share for each of the subsequent six years while in 2016 the full-year dividend was increased 4% to 65c.

Further to the dividend increase in 2016, an interim dividend of 19.2c (2016: 18.8c) per share was paid in November 2017. The Board is recommending a final dividend of 48.8c per share. This would give a total dividend of 68.0c for the year, an increase of 5% over last year (2016: 65.0c). The earnings per share for the year were 226.8c representing a cover of 3.3 times the proposed dividend for the year. Excluding the one-off impact of changes in corporate tax rates in the US and the past service credit from the Swiss pension plan amendment, adjusted basic earnings per share for the year would have been 166.2c\*, representing a cover of 2.4 times the proposed dividend for 2017.

It is proposed to pay the final dividend on 4 May 2018 to shareholders registered at the close of business on 9 March 2018. Subject to the

approval of resolutions 7 and 12 at the 2018 Annual General Meeting, shareholders are being offered a scrip dividend alternative.

While the Board continues to believe that a progressive dividend policy is appropriate for the Group, our target is to build dividend cover to three times before one-off items, and accordingly any dividend increases in coming years will continue to lag increases in earnings per share.

## 2018 Outlook

The 2018 outlook set out in the Chief Executive's Review on page 9 is deemed to be incorporated in this part of the Directors' Report.

## Principal Risks and Uncertainties

Pursuant to Section 327(1)(b) of the Companies Act 2014, Regulation 5(4)(c) (ii) of the Transparency (Directive 2004/109/EC) Regulations 2007, the principal risks and uncertainties that could affect the Group's business are set out on pages 102 to 107 and are deemed to be incorporated in this part of the Directors' Report. These risks and uncertainties reflect the international scope of the Group's operations and its decentralised structure. If any of these risks occur, the Group's business, financial condition, results of operations, liquidity and/or prospects could be materially adversely affected.

## Regulatory Information†

Table 42

**Companies Act 2014** For the purpose of Section 1373, the Corporate Governance Report on pages 62 to 71, together with the Governance Appendix located on the CRH website (www.crh.com), which contains the information required by Section 1373(2) of the Companies Act 2014 and the risk management disclosures on pages 20, 21 and 102 to 107, are deemed to be incorporated in the Directors' Report and form part of the corporate governance statement required by section 1373 of the Companies Act. Details of the Company's employee share schemes and capital structure can be found in notes 8 and 30 to the Consolidated Financial Statements on pages 144 to 146 and 182 to 184 respectively.

**2006 Takeover Regulations** For the purpose of Regulation 21 of Statutory Instrument 255/2006 European Communities (Takeover Bids (Directive 2004/25/EC)) Regulations 2006, the rules relating to the appointment and replacement of Directors are summarised in the Governance Appendix. The Chief Executive and the Finance Director have entered into service contracts, the principal terms of which are summarised in the 2016 Directors' Remuneration Policy which is available on the CRH website (www.crh.com) and are deemed to be incorporated in this part of the Directors' Report. The Company's Memorandum and Articles of Association, which are available on the CRH website, are also deemed to be incorporated in this part of the Directors' Report. The Group has certain banking facilities and bond issues outstanding which may require repayment in the event that a change in control occurs with respect to the Company. In addition, the Company's Share Option Schemes and Performance Share Plan contain change of control provisions which can allow for the acceleration of the exercisability of share options and the vesting of share awards in the event that a change of control occurs with respect to the Company.

**2007 Transparency Regulations** For the purpose of Statutory Instrument 277/2007 Transparency (Directive 2004/109/EC) Regulations 2007, the Sustainability Report as published on the CRH website (www.crh.com) is deemed to be incorporated in this part of the Directors' Report, together with the following sections of this Annual Report and Form 20-F: the Chairman's Introduction on page 5, the Strategy Review section on pages 6 to 21, the Principal Risks and Uncertainties section on pages 102 to 107, the Business Performance section on pages 22 to 55, the details of earnings per Ordinary Share in note 13 to the Consolidated Financial Statements, the details of derivative financial instruments in note 25, the details of the reissue of Treasury Shares in note 30 and the details of employees in note 6.

**Non-Financial Reporting** For the purpose of Statutory Instrument 360/2017 European Union (Disclosure of Non-Financial and Diversity Information by certain large undertakings and groups) Regulations 2017, the Sustainability Report\* as published on the CRH website (www.crh.com) is deemed to be incorporated in this part of the Directors' Report, together with the following sections of this Annual Report and Form 20-F: the Business Model section on pages 12 and 13, the Sustainability section, including greenhouse gas emissions, on pages 16 to 19, the Risk Governance section on pages 20 and 21, the Principal Risks and Uncertainties section on pages 102 to 107, the Measuring Performance section on pages 14 and 15 and the Business Performance section on pages 22 to 55.

**Disclaimer/Forward-Looking Statements** In order to utilise the "Safe Harbor" provisions of the United States Private Securities Litigation Reform Act of 1995, CRH plc (the "Company"), and its subsidiaries (collectively, "CRH" or the "Group") is providing the following cautionary statement.

This document contains certain forward-looking statements with respect to the financial condition, results of operations, business, viability and future performance of CRH and certain of the plans and objectives of CRH including the statements under: "Strategy Review – Chief Executive's Review – Outlook"; the "Strategy Review" about our vision to be the leading building materials business in the world; in "Measuring Performance" with regard to our 2018 focus; in the "Business Performance – Finance Director's Review" with respect to our belief that the Group has sufficient resources to meet its debt obligations and capital and other expenditure requirements in 2018; in "Business Performance" with respect to our expectations regarding economic activity and fiscal developments in our operating regions; our expectations for the residential, non-residential and infrastructure markets; and our potential future growth in Asia; and the statements relating to our strategies for individual segments and business lines in the section entitled "Segmental Reviews".

These forward-looking statements may generally, but not always, be identified by the use of words such as "will", "anticipates", "should", "expects", "is expected to", "estimates", "believes", "intends" or similar expressions.

By their nature, forward-looking statements involve risk and uncertainty because they relate to events and depend on circumstances that may or may not occur in the future and reflect the Company's current expectations and assumptions as to such future events and circumstances that may not prove accurate. A number of material factors could cause actual results and developments to differ materially from those expressed or implied by these forward-looking statements, certain of which are beyond our control and which include, among other things: economic and financial conditions generally in various countries and regions where we operate; the pace of recovery in the overall construction and building materials sector; demand for infrastructure, residential and non-residential construction in our geographic markets; increased competition and its impact on prices; increases in energy and/or raw materials costs; adverse changes to laws and regulations; approval or allocation of funding for infrastructure programmes; adverse political developments in various countries and regions; failure to complete or successfully integrate acquisitions; and the specific factors identified in the discussions accompanying such forward-looking statements and in the Principal Risks and Uncertainties included on pages 102 to 107 of the Directors' Report and in the Risk Factors included on pages 218 to 227 of this Annual Report and Form 20-F.

You should not place undue reliance on any forward-looking statements. These forward-looking statements are made as of the date of this Directors' Report. The Company expressly disclaims any obligation to update these forward-looking statements other than as required by law.

The forward-looking statements in this Annual Report and Form 20-F do not constitute reports or statements published in compliance with any of Regulations 4 to 8 and 26 of the Transparency (Directive 2004/109/EC) Regulations 2007.

## Location of Information required pursuant to Listing Rule 9.8.4C

Table 41

Listing Rule	Information to be included (i):
LR 9.8.4 (12) and (13)	Waivers of Dividends Disclosure The Trustees of the Employee Benefit Trust have elected to waive dividends in respect of certain holdings of CRH shares. See page 184 to the Consolidated Financial Statements.

(i) No information is required to be disclosed in respect of Listing Rules 9.8.4 (1), (2), (4), (5), (6), (7), (8), (9), (10), (11) and (14).

† This table contains information which is required to be provided for regulatory purposes.

\* For the purposes of the Company's Annual Report on Form 20-F as filed with the SEC, the Sustainability Report, and any reference thereto, is explicitly excluded from this Directors' Report.



# Directors' Report - continued

## Viability Statement

In accordance with Provision C.2.2. of the 2016 UK Corporate Governance Code, the Board has carried out a robust assessment of the principal risks facing the Group, including those which would threaten its business model, future performance, solvency or liquidity. The nature of and the strategies, practices and controls to mitigate those risks are addressed in the Principal Risks and Uncertainties section on pages 102 to 107.

Using the Group Strategic Plan (the 'Plan'), which is prepared annually on a bottom up basis and is approved by the Board, the prospects of the Group have been assessed over a three-year period from 1 January 2018 to 31 December 2020 inclusive. The projections in the Plan consider the Group's cash flows, committed funding and liquidity positions, forecast future funding requirements, banking covenants and other key financial ratios, including those relevant to maintaining the Group's investment grade credit ratings.

Appropriate stress testing of certain key performance, solvency and liquidity assumptions underlying the Plan has been conducted taking account of the principal risks and uncertainties faced and possible severe but plausible combinations of those risks and uncertainties. Whilst each of the principal risks and uncertainties set out in this Directors' Report could have an impact, the sensitivity analysis focused on the economic environment (captioned Industry Cyclicity and Political and Economic Uncertainty in the Principal Risks and Uncertainties disclosure) and regulatory compliance (captioned Laws and Regulations) and presumed the availability and effectiveness of various mitigating actions which could realistically be implemented to avoid or reduce the impact or occurrence of those risks and uncertainties. In evaluating the likely effectiveness of such actions, the conclusions of the Board's regular monitoring and review of risk management and internal control systems were taken into account.

As a result of this assessment, the Board has a reasonable expectation that the Group will be able to continue in operation and meet its liabilities as they fall due over the aforementioned three-year period.

## Going Concern

The Group's business activities, together with the factors likely to affect its future development, performance and position, are set out in the Strategy Review section and in this report on pages 10 to 21 and 102 to 107 respectively. The financial position of the Group, its cash flows, liquidity position and borrowing facilities are described in the Business Performance section on pages 22 to 55. In addition, notes 21 to 25 to the Consolidated Financial Statements include the Group's objectives, policies and processes for managing its capital; its financial risk management objectives; details of its financial instruments and hedging activities; and its exposures to credit, currency, cash flow and liquidity risks.

The Group has considerable financial resources and a large number of customers and suppliers across different geographic areas and industries. In addition, the local nature of building materials means that the Group's products are not usually shipped cross-border.

Having assessed the relevant business risks, the Directors believe that the Group is well placed to manage these risks successfully, and they have a reasonable expectation that CRH plc, and the Group as a whole, has adequate resources to continue in operational existence for the foreseeable future with no material uncertainties. For this reason, the Directors continue to adopt the going concern basis in preparing the Consolidated Financial Statements.

## Risk Management and Internal Control\*

The Directors confirm that, in addition to the monitoring carried out by the Audit Committee under its Terms of Reference, they have reviewed the effectiveness of the Group's risk management and internal control systems up to and including the date of approval of the financial statements. This review had regard to all material controls, including financial, operational and compliance controls that could affect the Group's business.

## Directors' Compliance Statement

It is the policy of the Company to comply with its relevant obligations (as defined in the Companies Act 2014). The Directors have drawn up a compliance policy statement (as defined in section 225(3)(a) of the Companies Act 2014) and arrangements and structures are in place that are, in the Directors' opinion, designed to secure material compliance with the Company's relevant obligations. The Directors confirm that these arrangements and structures were reviewed during the financial year. As required by Section 225(2) of the Companies Act 2014, the Directors acknowledge that they are responsible for the Company's compliance with the relevant obligations. In discharging their responsibilities under Section 225, the Directors relied on the advice both of persons employed by the Company and of persons retained by the Company under contract, who they believe have the requisite knowledge and experience to advise the Company on compliance with its relevant obligations.

## Directors' Remuneration Report

Resolution 3 to be proposed at the 2018 AGM deals with the 2017 Directors' Remuneration Report (excluding the 2016 Remuneration Policy Section), as set out on pages 72 to 95, which the Board has again decided to present to shareholders for the purposes of a non-binding advisory vote. This is in line with international best practice.

## Changes to the Board of Directors

- Gillian Platt was appointed to the Board on 1 January 2017
- Maëve Carton retired from the Board on 31 August 2017
- Ernst Bärtschi resigned from the Board on 20 December 2017
- Richard Boucher was appointed to the Board with effect from 1 March 2018

Under the Company's Articles of Association, co-opted Directors are required to submit themselves to shareholders for election at the AGM following their appointment and all Directors are required to submit themselves for re-election at intervals of not more than three years. However, in accordance with the provisions contained in the UK Corporate Governance Code, the Board has decided that all Directors eligible for re-election should retire at each AGM and offer themselves for re-election.

## Auditors

As required under Section 381(1)(b) of the Companies Act 2014, the AGM agenda includes a resolution authorising the Directors to fix the remuneration of the auditors.

Section 383 of the Companies Act 2014 provides for the automatic reappointment of the auditor of an Irish company at a company's annual general meeting, unless the auditor has given notice in writing of his unwillingness to be reappointed or a resolution has been passed at that meeting appointing someone else or providing expressly that the incumbent auditor shall not be reappointed. The auditors, EY, Chartered Accountants, are willing to continue in office.

Notwithstanding the provisions of Irish company law, the Board has decided to provide shareholders with an opportunity to have a say on the continuance in office of EY and a non-binding resolution has been included on the agenda for the 2018 AGM for this purpose.

## Authority to Allot Shares

The Directors require the authority of the shareholders to allot any unissued Ordinary Share capital of the Company. Accordingly, an ordinary resolution will be proposed at the 2018 AGM (Resolution 7) to renew the annual authority for that purpose. The authority will be for an amount which represents just under 50% of the issued Ordinary Share capital as at 28 February 2018. Any allotment exceeding 33% of the issued Ordinary Share capital will only be made pursuant to a fully pre-emptive issue and no issue of shares will be made which could effectively alter control of the Company without prior approval of the Company in General Meeting.

The Directors have no present intention of making any issue of shares, other than in connection with the Group's share incentive plans and scrip dividend scheme. If approved, this authority will expire on the earlier of the date of the AGM in 2019 or 25 July 2019.

## Disapplication of Pre-emption Rights

Resolutions 8 and 9 are special resolutions which, if approved by shareholders, will renew the annual authorities of the Directors to disapply statutory pre-emption rights in relation to allotments of Ordinary Shares for cash in certain circumstances.

Resolution 8 will, if approved, authorise the Directors to allot Ordinary Shares on a non-pre-emptive basis and for cash (otherwise than in connection with a rights issue or similar pre-emptive issue) up to a maximum nominal value of €14,262,000. This amount represents approximately 5% of the issued Ordinary Share capital as at 28 February 2018, being the latest practicable date prior to publication of this document. Resolution 8 will also allow the Directors to disapply pre-emption rights in order to accommodate any regulatory restrictions in certain jurisdictions.

Resolution 9 will, if approved, afford the Directors with an additional power to allot Ordinary Shares on a non-pre-emptive basis and for cash up to a further 5% of the issued share capital as at 28 February 2018. The power conferred by Resolution 9 can be used only in connection with an acquisition or a specified capital investment which is announced contemporaneously with the issue, or which has taken place in the preceding six-month period and is disclosed in the announcement of the issue.

The 5% limits in Resolutions 8 and 9 include any Treasury Shares reissued by the Company during the same period.

The Directors confirm that in respect of Resolutions 8 and 9, they intend to follow the Statement of Principles updated by the Pre-Emption Group in that allotments of shares for cash and the reissue of Treasury Shares on a non-pre-emptive basis (other than for an open offer or rights issue to Ordinary Shareholders, the operation of CRH's employee share schemes or in connection with

an acquisition or specified capital investment) will not exceed 7.5% of the issued Ordinary Share capital within a rolling three-year period without prior consultation with shareholders.

## Transactions in Own Shares

During 2017, 29,575 (2016: 711,839) Treasury Shares were reissued under the Group's employees' share schemes. As at 28 February 2018, 53,848 shares were held as Treasury Shares, equivalent to 0.006% of the Ordinary Shares in issue (excluding Treasury Shares).

A special resolution will be proposed at the 2018 AGM (Resolution 10) to renew the authority of the Company, or any of its subsidiaries, to purchase up to 10% of the Company's Ordinary/Income Shares in issue at the date of the AGM.

If approved, the minimum price which may be paid for shares purchased by the Company shall not be less than the nominal value of the shares and the maximum price will be 105% of the higher of the last independent trade in the Company's shares (or current independent bid, if higher) and the average market price of such shares over the preceding five days. A special resolution (Resolution 11) will also be proposed for the purpose of renewing the authority to set the maximum and minimum prices at which Treasury Shares (effectively shares purchased and not cancelled) may be reissued off-market by the Company. If granted, both of these authorities will expire on the earlier of the date of the AGM in 2019 or 25 July 2019.

As at 28 February 2018, options to subscribe for a total of 2,973,948 Ordinary/Income Shares are outstanding, representing 0.36% of the issued Ordinary/Income share capital (excluding Treasury Shares). If the authority to purchase Ordinary/Income Shares was used in full, the options would represent 0.40% of the remaining shares in issue.

The Directors do not have any current intention of exercising the power to purchase the Company's own shares and will only do so if they consider it to be in the best interests of the Company and its shareholders.



## Directors' Report - continued

### Authority to Offer Scrip Dividends

An ordinary resolution will be proposed at the 2018 AGM to renew the Directors' authority to make scrip dividend offers (Resolution 12). This authority will apply to dividends declared or to be paid commencing on 26 April 2018. Unless renewed at the AGM in 2019, this authority shall expire at the close of business on 25 July 2019.

### Amendments to Articles of Association

A special resolution will also be proposed at the 2018 AGM, which, if approved, will provide the Directors with important flexibility regarding the mechanism for setting the price for scrip dividend offers. Under the existing provisions of Article 137(b)(ii) the scrip price must be set by reference to the average price of an Ordinary Share on each of the first three business days on which the Ordinary Shares are quoted "ex" the relevant dividend. There can be circumstances where setting the price using this methodology may not be appropriate or in the best interests of shareholders. In such situations the only option currently open to the Board is to exercise its discretion to withdraw the scrip offer. The amendment will also provide the Board with flexibility in relation to the way in which the scrip dividend alternative plan is operated.

### Annual General Meeting

The Notice of Meeting for the 2018 AGM is available on the CRH website ([www.crh.com](http://www.crh.com)) and will be posted to shareholders on 28 March 2018.

### Statement of Directors' Responsibilities

The Directors as at the date of this report, whose names are listed on pages 59 to 61, are responsible for preparing the Annual Report and Form 20-F and Consolidated Financial Statements in accordance with applicable laws and regulations.

Irish company law requires the Directors to prepare financial statements for each financial year which give a true and fair view of the assets, liabilities, financial position of the Parent Company and of the Group, and of the profit or loss of the Group taken as a whole

for that period (the 'Consolidated Financial Statements').

In preparing the Consolidated Financial Statements, the Directors are required to:

- select suitable accounting policies and then apply them consistently;
- make judgements and estimates that are reasonable and prudent;
- comply with applicable International Financial Reporting Standards as adopted by the European Union, subject to any material departures disclosed and explained in the financial statements; and
- prepare the financial statements on the going concern basis unless it is inappropriate to presume that the Group will continue in business

The Directors are required by the Transparency (Directive 2004/109/EC) Regulations 2007 and the Transparency Rules of the Central Bank of Ireland to include a management report containing a fair review of the development and performance of the business and the position of the Parent Company and of the Group taken as a whole and a description of the principal risks and uncertainties facing the Group.

The Directors confirm that to the best of their knowledge they have complied with the above requirements in preparing the 2017 Annual Report and Form 20-F and Consolidated Financial Statements.

The considerations set out above for the Group are also required to be addressed by the Directors in preparing the financial statements of the Parent Company (which are set out on pages 200 to 205), in respect of which the applicable accounting standards are those which are generally accepted in Ireland.

The Directors have elected to prepare the Company Financial Statements in accordance with Irish law and accounting standards issued by the Financial Reporting Council and promulgated by the Institute of Chartered Accountants in Ireland (Generally Accepted Accounting Practice in Ireland), including FRS 101 *Reduced Disclosure Framework*, the Financial Reporting Standard applicable in the UK and Ireland.

The Directors are responsible for keeping adequate accounting records which disclose

with reasonable accuracy at any time the financial position of the Parent Company and which enable them to ensure that the Consolidated Financial Statements are prepared in accordance with applicable International Financial Reporting Standards as adopted by the European Union and comply with the provisions of the Companies Act 2014 and Article 4 of the IAS Regulation.

The Directors have appointed appropriate accounting personnel, including a professionally qualified Finance Director, in order to ensure that those requirements are met. The books and accounting records of the Company are maintained at the Group's administrative head offices located at Stonemason's Way, Rathfarnham, Dublin 16.

The Directors are also responsible for safeguarding the assets of the Group and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

Each of the Directors confirms that they consider that the Annual Report and Form 20-F and Consolidated Financial Statements, taken as a whole, is fair, balanced and understandable and provides the information necessary for shareholders to assess the Company's position, performance, business model and strategy.

For the purposes of Section 330 of the Companies Act 2014, each of the Directors also confirms that:

- so far as they are aware, there is no relevant audit information of which the Company's statutory auditors are unaware; and
- they have taken all the steps that they ought to have taken as Directors in order to make themselves aware of any relevant audit information and to establish that the Company's statutory auditors are aware of that information

On behalf of the Board,

**N. Hartery, A. Manifold**  
Directors

28 February 2018



Farrans, a Building and Civil Engineering division of Northstons, which is part of CRH's Europe Heavy Side Division, delivered Harburnhead Windfarm in Scotland ahead of schedule in 2017. The 82MW, 22 turbine 'Balance of Plant' contract included civil engineering and electrical infrastructure components, as well as major forestry works. Farrans has been involved in the construction of windfarms that produce more than 800MW of renewable energy across the United Kingdom.



## Principal Risks and Uncertainties

Under Section 327(1)(b) of the Companies Act 2014 and Regulation 5(4)(c)(ii) of the Transparency (Directive 2004/109/EC) Regulations 2007, the Group is required to give a description of the principal risks and uncertainties which it faces. These risks and uncertainties reflect the international scope of the Group's operations and the Group's decentralised structure. The risks and uncertainties presented below, which are supplemented by a broader discussion of Risk Factors set out on pages 218 to 227, are reviewed on an annual basis and represent the principal risks and uncertainties faced by the Group at the time of compilation of the 2017 Annual Report and Form 20-F. During the course of 2018, new risks and uncertainties may materialise attributable to changes in markets, regulatory environments and other factors and existing risks and uncertainties may become less relevant.

### Principal Strategic Risks and Uncertainties

#### Industry cyclicality

Risk	How we Manage the Risk
<p><b>Description:</b> The level of construction activity in local and national markets is inherently cyclical being influenced by a wide variety of factors including global and national economic circumstances, governments' ability to fund infrastructure projects, consumer sentiment and weather conditions. Financial performance may also be negatively impacted by unfavourable swings in fuel and other commodity/raw material prices.</p> <p><b>Impact:</b> Failure of the Group to respond on a timely basis and/or adequately to unfavourable events may adversely affect financial performance.</p>	<ul style="list-style-type: none"> <li>CRH's market and product diversification strategy, in addition to its spread of activity across multiple end-use sectors, means that recession would need to be general across the US and/or Europe to have a significant impact at Group level. CRH's geographic footprint is spread across 32 countries and multiple end-use sectors. CRH is the largest building materials company in North America and is a regional leader in Europe with strategic positions in Asia</li> <li>Through an ingrained philosophy of business improvement, the Group is strongly committed to ongoing cost control, strong cash generation and disciplined financial management. This commitment, and the strength of its reporting and internal control systems, assist the Group in responding quickly and hence mitigating the volatility associated with cyclicality</li> <li>The Group prioritises dynamic capital allocation and reallocation aimed at ensuring profitable growth across the Group's network of businesses</li> </ul>

#### Political and economic uncertainty

Risk	How we Manage the Risk
<p><b>Description:</b> As an international business, the Group operates in many countries with differing, and in some cases, potentially fast-changing economic, social and political conditions. These conditions, which may be heightened by the uncertainties resulting from the commencement of proceedings for the UK to exit the European Union, in addition to continued instability in Brazil, Philippines and Ukraine could include political unrest, currency disintegration, strikes, restrictions on repatriation of earnings, changes in law and policies, activism, and civil disturbance and may be triggered or worsened by other forms of instability including natural disasters, epidemics, widespread transmission of diseases and terrorist attacks. These factors are of particular relevance in developing/emerging markets.</p> <p><b>Impact:</b> Changes in these conditions, or in the governmental or regulatory requirements in any of the countries in which the Group operates, may adversely affect the Group's business, results of operations, financial condition or prospects thus leading to possible impairment of financial performance and/or restrictions on future growth opportunities.</p>	<ul style="list-style-type: none"> <li>The annual budgeting process is undertaken in two phases with prevailing economic and market forecasts factored into performance targets</li> <li>Commentaries and economic indicators are provided to senior management and the Board on a monthly basis together with trading results and forecasts to facilitate tracking of political and economic events which may create uncertainties as to financial performance</li> <li>Where political tensions are heightened, or materialise, mitigation strategies are in place to protect CRH's people and assets</li> </ul>

#### Commodity products and substitution

Risk	How we Manage the Risk
<p><b>Description:</b> The Group faces strong volume and price competition across its product lines, stemming from the fact that many of the Group's products are commodities. In addition, existing products may be replaced by substitute products which the Group does not produce or distribute, or new construction techniques may be devised.</p> <p><b>Impact:</b> Against this backdrop, if the Group fails to generate competitive advantage through differentiation and innovation, market share, and thus financial performance, may decline.</p>	<ul style="list-style-type: none"> <li>CRH endeavours to counter the competitive positioning difficulties posed by low barriers to entry across many of its markets, products and services through focusing on customer service and other means of differentiation</li> <li>Innovation and research and development are aimed at ensuring that the Group is constantly aligning its products and services to the demands of customers. These activities are business led and are guided by the Group Sustainability function</li> <li>Further details are outlined in the Group Sustainability Report, issued annually and approved by the Board</li> </ul>

#### Reserves availability and planning

Risk	How we Manage the Risk
<p><b>Description:</b> Certain of the Group's businesses require long-term reserves backing necessitating detailed utilisation planning. Appropriate reserves are an increasingly scarce commodity and licences and/or permits are required to enable operation. There are numerous uncertainties inherent in reserves estimation and in projecting future rates of production.</p> <p><b>Impact:</b> Failure by the Group to plan adequately for depletion may result in sub-optimal or uneconomic utilisation giving rise to unplanned capital expenditure or acquisition activity, lower financial performance and the need to obtain new licences and/or permits to operate. Operating entities may fail to obtain or renew or may experience material delays in securing the requisite government approvals, licences and permits for the conduct of business.</p>	<ul style="list-style-type: none"> <li>Planning for reserves enlargement and security of the requisite permits and licences is an ongoing process and a key focus for our heavyside businesses</li> <li>All operating companies are required to have an effective permit management system in place to ensure compliance with permit conditions as well as ensuring timely renewal of permits</li> <li>Group functions work continuously with operating entities to ensure efficient and economic utilisation of mineral reserves</li> </ul>

#### Business portfolio management: acquisition and divestment activity

Risk	How we Manage the Risk
<p><b>Description:</b> Growth through acquisition and active management of the Group's business portfolio are key elements of the Group's strategy with the Group's balanced portfolio growing year on year through bolt-on activity occasionally supplemented by larger and/or step-change transactions.</p> <p>In addition, the Group may be liable or remain liable for the past acts, omissions or liabilities of companies or businesses it has acquired or divested.</p> <p><b>Impact:</b> The Group may not be able to continue to grow as contemplated in its business plans if it is unable to identify attractive targets (including potential new platforms for growth), divest non-core or underperforming entities, execute full and proper due diligence, raise funds on acceptable terms, complete such acquisition transactions, integrate the operations of the acquired businesses, retain key staff and realise anticipated levels of profitability and cash flows. If the Group is held liable for the past acts, omissions or liabilities of companies or businesses it has acquired, or remains liable in cases of divestment, those liabilities may either be unforeseen or greater than anticipated at the time of the relevant acquisition or divestment.</p>	<ul style="list-style-type: none"> <li>CRH has traditionally grown through acquisition and as such has developed significant expertise in identifying and evaluating appropriate targets and conducting due diligence and subsequent integration</li> <li>Many of the Group's core markets remain fragmented or relatively unconsolidated and will continue to offer growth opportunities via the proven acquisition model in the decades ahead</li> <li>The Group's detailed due diligence and integration programmes are supported by external specialists where internal expertise is insufficient</li> <li>Further discussion is provided in the Business Performance section, Chairman's Introduction and Chief Executive's Review</li> </ul>



## Principal Strategic Risks and Uncertainties - continued

### Joint ventures and associates

Risk	How we Manage the Risk
<p><b>Description:</b> The Group does not have a controlling interest in certain of the businesses (i.e. joint ventures and associates) in which it has invested and may invest. The absence of a controlling interest gives rise to increased governance complexity and a need for proactive relationship management, which may restrict the Group's ability to generate adequate returns and to develop and grow these businesses.</p> <p><b>Impact:</b> These limitations could impair the Group's ability to manage joint ventures and associates effectively and/or realise its strategic goals for these businesses. In addition, improper management or ineffective policies, procedures or controls for non-controlled entities could adversely affect the business, results of operations or financial condition of the relevant investment.</p>	<ul style="list-style-type: none"> <li>Board-approved governance protocols are in place which require acquisition/investment contracts to contain appropriate provisions as regards future Board participation and ongoing management and interaction, amongst other items</li> <li>In joint venture arrangements, CRH has traditionally appointed CRH personnel, by way of the legal agreement entered into, to facilitate integration, assist in best practice transfer and drive performance and growth</li> </ul>

### Human resources and talent management

Risk	How we Manage the Risk
<p><b>Description:</b> Existing processes to recruit, develop and retain talented individuals and promote their mobility within a decentralised organisation may be inadequate thus giving rise to employee/management attrition, difficulties in succession planning and inadequate "bench strength", potentially impeding the continued realisation of the core strategic objectives of value creation and growth. In addition, the Group is exposed to various risks associated with collective representation of employees in certain jurisdictions; these risks could include strikes and increased wage demands.</p> <p><b>Impact:</b> In the longer term, failure to manage talent and plan for leadership and succession could impede the realisation of core strategic objectives.</p>	<ul style="list-style-type: none"> <li>Succession planning and talent management initiatives are implemented in an organised and concerted way in respect of all senior management positions across the Group. These exercises are promoted and co-ordinated by Group Human Resources &amp; Talent Management with support from senior operational and HR executives across the Group</li> <li>Through appropriate structures, the Group and its operating entities seek to maintain positive employee and trade/labour union relations which are key to successful operations</li> </ul>

## Principal Operational Risks and Uncertainties

### Sustainability, corporate social responsibility and climate change

Risk	How we Manage the Risk
<p><b>Description:</b> The Group is subject to stringent and evolving laws, regulations, standards and best practices from a sustainability perspective. The Group's use of the term "sustainability" comprises Health &amp; Safety management (i.e. embedding a culture of safety and ensuring safe working environments), conducting business with integrity, protecting the environment, preparing for and managing the impact of climate change on business activities, managing stakeholders, attaining strong social performance credentials and, lastly, using the foregoing to generate innovation and other business opportunities to create value. Against this backdrop, the nature of the Group's activities pose or create certain inherent risks, responsibility for which is vested with operating entity management, Group and Divisional management and the Board of Directors.</p> <p><b>Impact:</b> Non-adherence to the many laws, regulations, standards and best practices in the sustainability arena may give rise to increased ongoing remediation and/or other compliance costs and may adversely affect the Group's business, results of operations, financial condition and/or prospects. Failure to leverage innovation and other sustainability initiatives may shorten product life cycles or give rise to early product obsolescence thus impairing financial performance and/or future value creation. In addition, the failure to embed sustainability principles across the Group's businesses and in the Group's strategy may lead to adverse investor sentiment or reduced investor interest in CRH plc's Ordinary Shares.</p>	<ul style="list-style-type: none"> <li>CRH's strategy and business model are built around sustainable, responsible and ethical performance. Sustainability and Corporate Social Responsibility ("CSR") concepts are embedded in all CRH operations and activities. Excellence in the areas of Health &amp; Safety, Environment &amp; Climate Change, Governance and People &amp; Community is a daily priority of line management with regular reporting to Group management and to the Board of Directors</li> <li>The Group has implemented detailed policies and procedures promoting Health &amp; Safety, Environmental Practices and Energy Efficiency</li> <li>Sustainability performance is subject to rigorous external evaluation on an annual basis. The Group's achievements have been recognised through its inclusion in a variety of leading global sustainability indices and are communicated to investors as part of the Group's investor relations efforts</li> <li>Further details are outlined in the Group Sustainability Report, issued annually and approved by the Board</li> </ul>

## Principal Operational Risks and Uncertainties - continued

### Operational continuity

Risk	How we Manage the Risk
<p><b>Description:</b> The Group's operating entities are subject to a wide range of operating risks and hazards including climatic conditions such as floods and hurricanes/cyclones, seismic activity, technical failures, interruptions to power supplies, industrial accidents and disputes, environmental hazards, fire and crime.</p> <p><b>Impact:</b> The occurrence of a significant adverse event could lead to prolonged disruption of business activities and, as a result, could have a material impact on the business, results of operations, financial condition or prospects of the Group.</p>	<ul style="list-style-type: none"> <li>In general, the geographical spread and, in many instances, the concentration of the Group's activities in specific market areas facilitates continuity management if an adverse event was to materialise</li> <li>Strong adherence to Group policies on property management, quality control, Information Security, Health &amp; Safety and Sustainability assist in avoiding potential loss events. Captive insurance entities, which are wholly-owned subsidiaries, play a critical role in CRH's insurable risk management strategies</li> <li>Constant monitoring of the risk environment to determine whether all key risks are covered by insurance, where practicable and sensible</li> <li>Insurance protection is provided at a level believed to be commensurate with the associated risks, and is maintained with leading, highly-rated international insurers with appropriate risk retention by insurance captives and by insured entities in the context of deductibles/excesses borne</li> </ul>

### Information technology and security/cyber

Risk	How we Manage the Risk
<p><b>Description:</b> The Group is dependent on the employment of advanced information systems (digital infrastructure, applications and networks) to support its business activities, and is exposed to risks of failure in the operation of these systems. Further, the Group is exposed to security threats to its digital infrastructure through cyber-crime. Such attacks are by their nature technologically sophisticated and may be difficult to detect and defend in a timely fashion.</p> <p><b>Impact:</b> Should a security breach or other incident materialise, it could lead to interference with production processes, manipulation of financial data, the theft of private data or intellectual property, misappropriation of funds, or misrepresentation of information via digital media. In addition to potential irretrievability or corruption of critical data, the Group could suffer reputational losses, regulatory penalties and incur significant financial costs in remediation.</p>	<ul style="list-style-type: none"> <li>Ongoing strategic and tactical efforts to address the evolving nature of cyber threats and the challenges posed, including the revision of internal practices and controls</li> <li>Enhancement of existing information and cyber security practices towards best practices for organisational assets, which include people, processes and technology</li> <li>Ongoing investment and development of risk management and governance associated with cyber security and information technology</li> </ul>



## Principal Compliance Risks and Uncertainties

### Laws and regulations

Risk	How we Manage the Risk
<p><b>Description:</b> The Group is subject to many local and international laws and regulations, including those relating to competition law, corruption and fraud, across many jurisdictions of operation and is therefore exposed to changes in those laws and regulations and to the outcome of any investigations conducted by governmental, international or other regulatory authorities.</p> <p><b>Impact:</b> Potential breaches of local and international laws and regulations in the areas of competition law, corruption and fraud, among others, could result in the imposition of significant fines and/or sanctions for non-compliance, including the withdrawal of operating licences, and may inflict reputational damage.</p>	<ul style="list-style-type: none"> <li>CRH's Code of Business Conduct, which is in effect mandatorily across the Group, stipulates best practice in relation to regulatory and compliance matters amongst other issues. The Code is available on <a href="http://www.crh.com">www.crh.com</a></li> <li>Proactive on-the-ground engagement throughout the Group, through an extensive training programme, a dedicated whistleblowing hotline (the results of which are reported to the Audit Committee) and detailed policies and procedures to support the Code of Business Conduct</li> <li>Significant internal controls and compliance policies have been implemented in order to promote strong and ongoing compliance with all laws and regulations, including the UK Bribery Act, 2010 and the US Foreign Corrupt Practices Act, 1977</li> </ul>

## Principal Financial and Reporting Risks and Uncertainties

### Financial instruments (interest rate and leverage, foreign currency, counterparty, credit ratings and liquidity)

Risk	How we Manage the Risk
<p><b>Description:</b> The Group uses financial instruments throughout its businesses giving rise to interest rate and leverage, foreign currency, counterparty, credit rating and liquidity risks. A significant portion of the cash generated by the Group from operational activity is currently dedicated to the payment of principal and interest on indebtedness. In addition, the Group has entered into certain financing agreements containing restrictive covenants requiring it to maintain a certain minimum interest coverage ratio and a certain minimum net worth.</p> <p><b>Impact:</b> A downgrade of the Group's credit ratings may give rise to increases in funding costs in respect of future debt and may impair the Group's ability to raise funds on acceptable terms. In addition, insolvency of the financial institutions with which the Group conducts business (or a downgrade in their credit ratings) may lead to losses in derivative assets and cash and cash equivalents balances or render it more difficult for the Group either to utilise existing debt capacity or otherwise obtain financing for operations.</p>	<ul style="list-style-type: none"> <li>Fixed and floating rate debt and interest rate swaps are used to manage borrowing costs, while currency swaps and forward foreign currency contracts are used to manage currency exposures and to achieve the desired profile of borrowings</li> <li>The Group seeks to ensure that sufficient resources are available to meet the Group's liabilities as they fall due through a combination of cash and cash equivalents, cash flows and undrawn committed bank facilities. Systems are in place to monitor and control the Group's liquidity risks, which are reported to the Board on a monthly basis. Cash flow forecasting is provided to executive management on a daily basis</li> <li>The Group's established policy is to spread its net worth across the currencies of its various operations with the objective of limiting its exposure to individual currencies</li> <li>All of the Group's financial counterparties are leading financial institutions of international scope with a minimum S&amp;P credit rating of A-</li> <li>Please see note 22 to the Consolidated Financial Statements for further detail</li> </ul>

### Defined benefit pension schemes and related obligations

Risk	How we Manage the Risk
<p><b>Description:</b> The Group operates a number of defined benefit pension schemes and schemes with related obligations (for example, termination indemnities and jubilee/long-term service benefits, which are accounted for as defined benefit) in certain of its operating jurisdictions. The assets and liabilities of defined benefit pension schemes may exhibit significant period-on-period volatility attributable primarily to asset values, changes in bond yields/discount rates and anticipated longevity.</p> <p><b>Impact:</b> In addition to the contributions required for the ongoing service of participating employees, significant cash contributions may be required to remediate deficits applicable to past service. Further, fluctuations in the accounting surplus/deficit may adversely impact the Group's credit metrics thus harming its ability to raise funds.</p>	<ul style="list-style-type: none"> <li>Where feasible, defined benefit pension schemes have been closed to future accrual. Where closure to future accrual was not feasible for legal and other reasons, the relevant final salary schemes were transitioned to a career-average methodology for future service with severance of the final salary link and the introduction of defined contribution for new entrants</li> <li>De-risking frameworks (for example, Liability-Driven Investment techniques) have been instituted to mitigate deficit volatility and enable better matching of investment returns with the cash outflows related to benefit obligations</li> <li>Deficit reparation initiatives are in place for all of the defined benefit pension schemes in the Republic of Ireland. The funding proposals governing the quantum and regularity of contributions have been agreed with the Pensions Board. In most cases, on the assumption that funding levels remain on track, the reparation periods cease in 2018</li> <li>Defined benefit pension scheme exposures and the mitigation strategies in place are reviewed by the Audit Committee on a periodic basis</li> </ul>

## Principal Financial and Reporting Risks and Uncertainties - continued

### Taxation charge and balance sheet provisioning

Risk	How we Manage the Risk
<p><b>Description:</b> The Group is exposed to uncertainties stemming from governmental actions in respect of taxes paid and payable in all jurisdictions of operation. In addition, various assumptions are made in the computation of the overall tax charge and in balance sheet provisions which may not be borne out in practice.</p> <p><b>Impact:</b> Changes in the tax regimes and related government policies and regulations in the countries in which the Group operates could adversely affect its results and its effective tax rate. The final determination of tax audits or tax disputes may be different from that which is reflected in the Group's historical income tax provisions and accruals. If future audits find that additional taxes are due, the Group may be subject to incremental tax liabilities, possibly including interest and penalties, which could have a material adverse effect on cash flows, financial condition and results of operations.</p>	<ul style="list-style-type: none"> <li>The Group Tax Guidelines and Group Transfer Pricing Guidelines provide a tax governance framework operable throughout the Group</li> <li>Group Tax is managed by in-house specialists with significant experience. The in-house expertise is supplemented by the assistance of external advisors where required</li> <li>Group Tax, and the responsible individuals at operating company level, monitor potential changes in tax legislation and policy in all jurisdictions of operation</li> <li>The Group Tax Director reports directly to the Group Finance Director and provides regular tax updates to the Finance Director and the Finance Committee. This ensures that the related risks are actively managed and monitored</li> </ul>

### Foreign currency translation

Risk	How we Manage the Risk
<p><b>Description:</b> The principal foreign exchange risks to which the Consolidated Financial Statements are exposed pertain to adverse movements in reported results when translated into euro (which is the Group's reporting currency) together with declines in the euro value of net investments which are denominated in a wide basket of currencies other than the euro.</p> <p><b>Impact:</b> Adverse changes in the exchange rates used to translate foreign currencies into euro have impacted and will continue to impact retained earnings. The annual impact is reported in the Consolidated Statement of Comprehensive Income.</p>	<ul style="list-style-type: none"> <li>The Group's activities are conducted primarily in the local currency of operation resulting in low levels of foreign currency transactional risk</li> <li>The Group's established policy is to spread its net worth across the currencies of the various operations with the objective of limiting its exposure to individual currencies and thus promoting consistency with the geographical balance of its operation</li> <li>The Group manages its multi-currency borrowings through hedging a portion of its foreign currency assets</li> <li>Sensitivity analysis is conducted in order to understand the impact of significant variances in currency fluctuations</li> </ul>

### Goodwill impairment

Risk	How we Manage the Risk
<p><b>Description:</b> Significant under-performance in any of the Group's major cash generating units or the divestment of businesses in the future may give rise to a material write-down of goodwill.</p> <p><b>Impact:</b> A write-down of goodwill could have a substantial impact on the Group's income and equity.</p>	<ul style="list-style-type: none"> <li>Economic indicators of goodwill impairment are monitored closely through the monthly reporting process and regular senior management dialogue in order to ensure that potential impairment issues are flagged on a timely basis and corrective action taken, where feasible</li> <li>Detailed impairment testing in respect of each of the cash-generating units across the Group is undertaken prior to year-end for the purposes of the Consolidated Financial Statements</li> <li>The goodwill impairment assessment is subject to regular review by the Audit Committee</li> <li>For further information on how we manage the risk posed by Goodwill impairment, please refer to note 15 to the Consolidated Financial Statements on pages 153 to 156</li> </ul>



# Financial Statements

## Consolidated Financial Statements



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CRH Americas Materials company, Jack B. Parson Companies supplied 16,000 cubic metres of specialised readymixed concrete during the construction of the award-winning '111 Main' office building in Salt Lake City, Utah. The 24-storey, sustainable, high-performance building was designed to operate 15% below the State's energy code.



# Independent Auditor's Irish Report to the members of CRH plc

## Opinion

We have audited the financial statements of CRH plc ('the Company') and its subsidiaries (together 'the Group') for the year ended 31 December 2017, which comprise the Consolidated Income Statement, the Consolidated Statement of Comprehensive Income, the Consolidated Balance Sheet, the Consolidated Statement of Changes in Equity, the Consolidated Statement of Cash Flows, the Company Balance Sheet, the Company Statement of Changes in Equity, the Accounting Policies including the summary of Significant Accounting Policies set out on pages 125 to 134 and notes to the financial statements. The financial reporting framework that has been applied in their preparation is Irish law and International Financial Reporting Standards ('IFRS') as adopted by the European Union and, as regards the Company financial statements, Accounting Standards including FRS 101 *Reduced Disclosure Framework* (Irish Generally Accepted Accounting Practice).

In our opinion:

- the Group financial statements and the Company financial statements give a true and fair view of the assets, liabilities and financial position of the Group and the Company as at 31 December 2017 and of the Group's profit for the year then ended;
- the Group financial statements have been properly prepared in accordance with IFRS as adopted by the European Union;
- the Company financial statements have been properly prepared in accordance with Irish Generally Accepted Accounting Practice; and
- the Group financial statements and the Company financial statements have been properly prepared in accordance with the requirements of the Companies Act 2014 and, as regards the Group financial statements, Article 4 of the IAS Regulation

## Basis for opinion

We conducted our audit in accordance with International Standards on Auditing (Ireland) ('ISAs (Ireland)') and applicable law. Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are independent of the Group and Company in accordance with ethical requirements that are relevant to our audit of financial statements in Ireland, including the Ethical Standard as applied to public interest entities issued by the Irish Auditing and Accounting Supervisory Authority ('IAASA'), and we have fulfilled our other ethical responsibilities in accordance with these requirements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

## Overview of our audit approach

### Key audit matters

- Assessment of the carrying value of goodwill
- Assessment of the carrying value of property, plant and equipment and financial assets
- Revenue recognition for construction contracts
- Accounting for acquisitions

### Audit scope

- We performed an audit of the complete financial information of 19 components and performed audit procedures on specific balances for a further 51 components
- The components where we performed either full or specific audit procedures accounted for 93% of Profit before tax, 85% of Revenue and 93% of Total Assets
- We have also performed full scope audit procedures for the component which comprised discontinued operations
- 'Components' represent business units across the Group considered for audit scoping purposes

### Materiality

- Overall Group materiality was assessed to be €100 million which represents approximately 5% of Profit before tax from continuing and discontinued operations

### What has changed?

- In the prior year, our auditor's report included a risk of material misstatement in relation to the finalisation of the provisional accounting for the LafargeHolcim (LH) assets. In the current year, we have removed this risk of material misstatement as it is no longer applicable as the provisional accounting was finalised in 2016
- In the current year, our auditor's report includes accounting for acquisitions as a key audit matter. In 2017, the total aggregate consideration for acquisitions amounted to €2.1 billion compared to €0.2 billion in the prior year

## Key audit matters

Key audit matters are those matters that, in our professional judgement, were of most significance in our audit of the financial statements of the current period and include the most significant assessed risks of material misstatement (whether or not due to fraud) that we identified, including those which had the greatest effect on: our overall audit strategy, the allocation of resources in the audit and directing of the efforts of the engagement team. These matters were addressed in the context of our audit of the financial statements as a whole, and in forming our opinion thereon, and we do not provide a separate opinion on these matters.

Risk	Our response to the risk	Key observations communicated to the Audit Committee
<p><b>Assessment of the carrying value of goodwill</b></p> <p>The impairment review of goodwill, with a carrying value of €6.9 billion, is considered to be a risk area due to the size of the balance as well as the fact that it involves significant judgement by management. Judgemental aspects include assumptions of future profitability, revenue growth, margins and forecast cash flows, and the selection of appropriate discount rates, all of which may be subject to management override.</p> <p>There has been no change in this risk from the prior year.</p> <p>Refer to the Audit Committee Report (page 64); Accounting policies (page 125); and note 15 of the Consolidated Financial Statements (page 153).</p>	<p>Our specialist valuations team performed an independent assessment against external market data of key inputs used by management in calculating appropriate discount rates, principally risk-free rates, country risk premium and inflation rates.</p> <p>We challenged the determination of the Group's 25 cash-generating units (CGUs) and flexed our audit approach relative to our risk assessment and the level of excess of value-in-use over carrying amount in each CGU. For all CGUs selected for detailed testing, we corroborated key assumptions in the models and benchmarked growth assumptions to external economic forecasts and construction activity measures.</p> <p>We challenged management's sensitivity analyses and performed our own sensitivity calculations to assess the level of excess of value-in-use over the goodwill carrying amount in place based on reasonably possible changes in such assumptions.</p> <p>We considered the adequacy of management's disclosures in respect of impairment testing and whether the disclosures appropriately communicate the underlying sensitivities.</p> <p>The above procedures were performed predominantly by the Group audit team.</p>	<p>We completed our planned audit procedures with no exceptions noted.</p> <p>Consistent with the previous year, two CGUs had allocated goodwill balances of between 10% and 25% of total goodwill which the Group considered significant and therefore warranted separate disclosure. One additional CGU was determined to be sensitive in respect of the excess of value-in-use over its carrying value.</p>



## Independent Auditor's Irish Report - continued

Risk	Our response to the risk	Key observations communicated to the Audit Committee
<p><b>Assessment of the carrying value of property, plant and equipment (PP&amp;E) and financial assets</b></p> <p>The impairment review of PP&amp;E and financial assets, with a carrying value of €13.1 billion and €1.2 billion respectively, is considered to be a risk area due to the size of the balances as well as the judgemental nature of key assumptions, which may be subject to management override, similar to that noted in the assessment of the carrying value of goodwill above.</p> <p>There has been no change in this risk from the prior year.</p> <p>Refer to the Audit Committee Report (page 64); Accounting policies (page 125); and note 14 and note 16 of the Consolidated Financial Statements (pages 152 and 157).</p>	<p>In respect of the discount rate, we performed similar procedures to those noted above for goodwill.</p> <p>The Group operates a variety of business models and as a result the identification of CGUs for testing is based on these business models and management's assessment of impairment indicators.</p> <p>Similar audit procedures to those noted under goodwill above are performed in respect of the key assumptions underpinning the impairment models.</p> <p>We performed the above procedures in 33 components representing 92% of total PP&amp;E and financial asset carrying values.</p>	<p>Our planned audit procedures were completed without exception.</p>
<p><b>Revenue recognition for construction contracts</b></p> <p>There are significant accounting judgements including determining the stage of completion, the timing of revenue recognition and the calculation under the percentage-of-completion method, made by management in applying the Group's revenue recognition policies to long-term contracts entered into by the Group. The nature of these judgements results in them being susceptible to management override.</p> <p>The majority of the Group's construction contracts have a maturity within one year. There is significant seasonality to when services are rendered under these construction contracts, with the majority of the work historically performed in the summer months and, consequently, most are completed prior to the year-end.</p> <p>Total revenue for construction contracts was €5.2 billion which represents 21% of the Group's revenue in 2017.</p> <p>There has been no change in this risk from the prior year.</p> <p>Refer to the Audit Committee Report (page 64); Accounting policies (page 125); and note 1 of the Consolidated Financial Statements (page 135).</p>	<p>We performed a range of audit procedures which included obtaining a sample of contracts, reviewing for change orders, retrospectively reviewing estimated profit and costs to complete and enquiring of key personnel regarding adjustments for job costing and potential contract losses.</p> <p>We performed the above procedures in eight components representing 96% of construction contract revenue recognised during the year.</p>	<p>Our observations included an outline of the range of audit procedures performed, the key judgements made by management in recognising revenue, margin and provisioning on loss-making contracts and the results of our testing.</p>
<p><b>Accounting for acquisitions</b></p> <p>During 2017, the Group completed 31 acquisitions at a cost of €2.1 billion. Acquisitions continue to be a significant focus area for the Group and an area where we allocate significant resources in directing the efforts of the engagement team.</p> <p>Refer to the Audit Committee Report (page 64); Accounting policies (page 125); and note 31 of the Consolidated Financial Statements (page 185).</p>	<p>Our specialist valuations team challenged purchase price allocation adjustments, deferred consideration and the identification and valuation of acquired intangible assets as all such elements involve significant judgement by management.</p> <p>We also considered the adequacy of the related disclosures (note 31). The above procedures are performed both locally and by the Group audit team, and covered 84% of acquisition spend.</p>	<p>Our procedures in respect of current year acquisitions were focused on four acquisitions which together comprised 84% of total acquisition spend.</p> <p>Substantial audit resources were allocated to these procedures, including evaluation of the work done by experts utilised by management and involvement of our own specialists, in particular with respect to the purchase price allocations for the businesses acquired; and the audit of the opening balance sheets by component teams.</p>

### Our application of materiality

We apply the concept of materiality in planning and performing the audit, in evaluating the effect of identified misstatements on the audit and in forming our audit opinion.

### Materiality

The magnitude of an omission or misstatement that, individually or in the aggregate, could reasonably be expected to influence the economic decisions of the users of the financial statements. Materiality provides a basis for determining the nature and extent of our audit procedures.

We determined materiality for the Group to be €100 million (2016: €87 million), which is approximately 5% (2016: 5%) of Group Profit before tax from continuing and discontinued operations or 5.36% of Group Profit before tax from continuing operations. Profit before tax is a key performance indicator for the Group and is also a key metric used by the Group in the assessment of management's performance. We therefore considered Profit before tax to be the most appropriate performance metric on which to base our materiality calculation as we consider it to be the most relevant performance measure to the stakeholders of the Group.

We determined materiality for the Company to be €87 million (2016: €91 million), which is approximately 1% (2016: 1%) of total equity.

During the course of our audit, we reassessed initial materiality and the only change in final materiality was to reflect the actual reported performance of the Group in the year.

### Performance materiality

Performance materiality is the application of materiality at the individual account or balance level. It is set at an amount to reduce to an appropriately low level the probability that the aggregate of uncorrected and undetected misstatements exceeds materiality.

On the basis of our risk assessments, together with our assessment of the Group's overall control environment, our judgement was that performance materiality should be set at 50% (2016: 50%) of our planning materiality, namely

€50 million (2016: €43.5 million). We have set performance materiality at this percentage due to our past experience of the risk of misstatements, both corrected and uncorrected.

Audit work at component locations for the purpose of obtaining audit coverage over significant financial statement accounts is undertaken based on a percentage of total performance materiality. The performance materiality set for each component is based on the relative scale and risk of the component to the Group as a whole and our assessment of the risk of misstatement at that component. In the current year, the range of performance materiality allocated to components was €10.0 million to €32.5 million (2016: €7.5 million to €22.7 million).

### Reporting threshold

An amount below which identified misstatements are considered as being clearly trivial.

We agreed with the Audit Committee that we would report to them all uncorrected audit differences in excess of €5 million (2016: €4.35 million), which is set at approximately 5% of planning materiality, as well as differences below that threshold that, in our view, warranted reporting on qualitative grounds.

We evaluate any uncorrected misstatements against both the quantitative measures of materiality discussed above and in light of other relevant qualitative considerations in forming our opinion.

### An overview of the scope of our audit report

#### Tailoring the scope

Our assessment of audit risk, our evaluation of materiality and our allocation of performance materiality determine our audit scope for each entity within the Group. Taken together, this enables us to form an opinion on the Consolidated Financial Statements.

In determining those components in the Group to which we perform audit procedures, we utilised size and risk criteria in accordance with ISAs (Ireland).

In assessing the risk of material misstatement to the Group financial statements, and to ensure we had adequate quantitative coverage of significant accounts in the financial statements, we selected 70 (2016: 66) components covering entities across Europe and the Americas, as well as the Philippines, which represent the principal business units within the Group.

Of the 70 components selected, we performed an audit of the complete financial information of 19 (2016: 19) components ('full scope components') which were selected based on their size or risk characteristics. For the remaining 51 (2016: 47) components ('specific scope components'), we performed audit procedures on specific accounts within that component that we considered had the potential for the greatest impact on the significant accounts in the financial statements either because of the size of these accounts or their risk profile.

The reporting components where we performed audit procedures accounted for 93% (2016: 93%) of the Group's Profit before tax, 85% (2016: 86%) of the Group's Revenue and 93% (2016: 93%) of the Group's Total Assets.

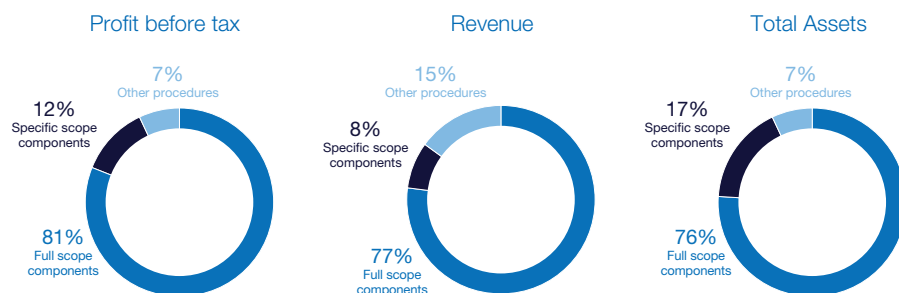
For the current year, the full scope components contributed 81% (2016: 77%) of the Group's Profit before tax, 77% (2016: 78%) of the Group's Revenue and 76% (2016: 78%) of the Group's Total Assets. The specific scope components contributed 12% (2016: 16%) of the Group's Profit before tax, 8% (2016: 8%) of the Group's Revenue and 17% (2016: 15%) of the Group's Total Assets. The audit scope of these components may not have included testing of all significant accounts of the component but will have contributed to the coverage of significant risks tested for the Group.

Of the remaining components, which together represent 7% (2016: 7%) of the Group's Profit before tax, none is individually greater than 5% of the Group's Profit before tax. For these components, we performed other procedures, including analytical review, testing of consolidation journals and intercompany eliminations and foreign currency translation recalculations to respond to any potential risks of material misstatement to the Consolidated Financial Statements.



## Independent Auditor's Irish Report - continued

The charts below illustrate the coverage obtained from the work performed by our audit teams based on continuing operations.



In 2017 and 2016 we have also performed full scope audit procedures for the component which comprised discontinued operations.

### Involvement with component teams

In establishing our overall approach to the Group audit, we determined the type of work that needed to be undertaken at each of the components by us, as the Group audit team, or by component auditors from other EY global network firms operating under our instruction. For the full scope and specific scope components, where the work was performed by component auditors, we determined the appropriate level of involvement to enable us to determine that sufficient audit evidence had

been obtained as a basis for our opinion on the Group as a whole.

We issued detailed instructions to each component auditor in scope for the Group audit, with specific audit requirements and requests across key areas. The Group audit team continued to perform a programme of site visits at key locations across the Group, visiting nine component teams during 2017 and visiting 44 component teams in the past five years. The visits conducted during the year involved discussing with the component team the audit approach

and any issues arising from their work, meeting with local management, attending planning and closing meetings and reviewing key audit working papers on risk areas. The Group audit team interacted regularly with all component teams where appropriate during various stages of the audit, reviewed key working papers and were responsible for the scope and direction of the audit process. This, together with the additional procedures performed at Group level, gave us appropriate evidence for our opinion on the Consolidated Financial Statements.

### Conclusions relating to principal risks, going concern and viability statement

We have nothing to report in respect of the following information in the Annual Report, in relation to which the ISAs (Ireland) require us to report to you whether we have anything material to add or draw attention to:

- the disclosures in the Annual Report set out on pages 102 to 107 that describe the principal risks and explain how they are being managed or mitigated;
- the Directors' confirmation set out on page 98 in the Annual Report that they have carried out a robust assessment of the principal risks facing the Group and the Company, including those that would threaten its business model, future performance, solvency or liquidity;
- the Directors' statement set out on page 98 in the financial statements about whether the Directors considered it appropriate to adopt the going concern basis of accounting in preparing the financial statements and the Directors' identification of any material uncertainties to the Group's and the Company's ability to continue to do so over a period of at least twelve months from the date of approval of the financial statements;
- whether the Directors' statement relating to going concern required under the Listing Rules in accordance with Listing Rule 6.8.3(3) is materially inconsistent with our knowledge obtained in the audit; or
- the Directors' explanation set out on page 98 in the Annual Report as to how they have assessed the prospects of the Group and the Company, over what period they have done so and why they consider that period to be appropriate, and their statement as to whether they have a reasonable expectation that the Group and the Company will be able to continue in operation and meet its liabilities as they fall due over the period of their assessment, including any related disclosures drawing attention to any necessary qualifications or assumptions

### Other information

The Directors are responsible for the other information. The other information comprises the information included in the Annual Report other than the financial statements and our auditor's report thereon. Our opinion on the financial statements does not cover the other information and, except to the extent otherwise explicitly stated in our report, we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit or otherwise appears to be materially misstated. If we identify such material inconsistencies or apparent material misstatements, we are required to determine whether there is a material misstatement in the financial statements or a material misstatement of the other information. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact.

We have nothing to report in this regard.

In this context, we also have nothing to report in regard to our responsibility to specifically address the following items in the other information and to report as uncorrected material misstatements of the other information where we conclude that those items meet the following conditions:

- Fair, balanced and understandable* (set out on page 100) – the statement given by the Directors that they consider the Annual Report and financial statements taken as a whole is fair, balanced and understandable and provides the information necessary for shareholders to assess the Group's and the Company's performance, business model and strategy, is materially inconsistent with our knowledge obtained in the audit; or
- Audit committee reporting* (set out on page 64) – the section describing the work of the Audit Committee does not appropriately address matters communicated by us to the audit committee is materially inconsistent with our knowledge obtained in the audit; or
- Directors' statement of compliance with the UK Corporate Governance Code* (set out on page 62) – the parts of the Directors' statement required under the Listing Rules relating to the Company's compliance with the UK Corporate Governance Code containing provisions specified for review by the auditor in accordance with Listing Rule 6.8.6 do not properly disclose a departure from a relevant provision of the UK Corporate Governance Code





## Independent Auditor's Irish Report - continued

### Opinions on other matters prescribed by the Companies Act 2014

Based solely on the work undertaken in the course of the audit, we report that:

- in our opinion, the information given in the Directors' Report is consistent with the financial statements; and
- in our opinion, the Directors' Report has been prepared in accordance with the Companies Act 2014

We have obtained all the information and explanations which we consider necessary for the purposes of our audit.

In our opinion the accounting records of the Company were sufficient to permit the financial statements to be readily and properly audited and the Company Balance Sheet is in agreement with the accounting records.

### Matters on which we are required to report by exception

Based on the knowledge and understanding of the Group and the Company and its environment obtained in the course of the audit, we have not identified material misstatements in the Directors' Report.

The Companies Act 2014 requires us to report to you if, in our opinion, the disclosures of Directors' remuneration and transactions required by sections 305 to 312 of the Act are not made. We have nothing to report in this regard.

### Respective responsibilities

#### Respective responsibilities of Directors for the financial statements

As explained more fully in the Statement of Directors' Responsibilities set out on page 100, the Directors are responsible for the preparation of the financial statements and for being satisfied that they give a true and fair view, and for such internal control as they determine is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the Directors are responsible for assessing the Group and the Company's ability to continue as going concerns, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Group or the Company or to cease operations, or has no realistic alternative but to do so.

#### Auditor's responsibilities for the audit of the financial statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs (Ireland) will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

The objectives of our audit, in respect to fraud, are: to identify and assess the risks of material misstatement of the financial statements due to fraud; to obtain sufficient appropriate audit evidence regarding the assessed risks of material misstatement due to fraud, through designing and implementing appropriate responses; and to respond appropriately to fraud or suspected fraud identified during the audit. However, the primary responsibility for the prevention and detection of fraud rests with both those charged with governance of the entity and management.

Our approach was as follows:

- We obtained an understanding of the legal and regulatory frameworks that are applicable to the Group across the various jurisdictions globally in which the Group operates. We determined that the most significant are those that relate to the form and content of external financial and corporate governance reporting including company law, tax legislation, employment law and regulatory compliance
- We understood how the Group is complying with those frameworks by making enquiries of management, internal audit, those responsible for legal and compliance procedures and the Company Secretary. We corroborated our enquiries through our review of the Group's Compliance Policy, board minutes, papers provided to the Audit Committee and correspondence received from regulatory bodies
- We assessed the susceptibility of the Group's financial statements to material misstatement, including how fraud might occur, by meeting with management, including within various parts of the business, to understand where they considered there was susceptibility to fraud. We also considered performance targets and the potential for management to influence earnings or the perceptions of analysts. Where this risk was considered to be higher, we performed audit procedures to address each identified fraud risk. These procedures included testing manual journals and were designed to provide reasonable assurance that the financial statements were free from fraud or error
- Based on this understanding we designed our audit procedures to identify non-compliance with such laws and regulations. Our procedures included a review of board minutes to identify any non-compliance with laws and regulations, a review of the reporting to the Audit Committee on compliance with regulations, enquiries of internal and external legal counsel and management

A further description of our responsibilities for the audit of the financial statements is located on the IAASA's website at: [http://www.iaasa.ie/getmedia/b2389013-1cf6-458b-9b8f-a98202dc9c3a/Description\\_of\\_auditors\\_responsibilities\\_for\\_audit.pdf](http://www.iaasa.ie/getmedia/b2389013-1cf6-458b-9b8f-a98202dc9c3a/Description_of_auditors_responsibilities_for_audit.pdf). This description forms part of our auditor's report.

### Other matters which we are required to address

We were appointed by the Board of Directors following the AGM held on 27 April 2017 to audit the financial statements for the year ended 31 December 2017. The period of total uninterrupted engagement including previous renewals and reappointments of the firm is 30 years.

Except for the inadvertent continuation of an immaterial and previously permissible service which was subsequently terminated as required under the Ethical Standard for Auditors (Ireland) April 2017, prohibited non-audit services referred to in article 5(1) of the Regulation were not provided to the Group and we remained independent of the Group in conducting our audit.

Our audit opinion is consistent with the additional report to the Audit Committee.

### The purpose of our audit work and to whom we owe our responsibilities

Our report is made solely to the Company's members, as a body, in accordance with section 391 of the Companies Act 2014. Our audit work has been undertaken so that we might state to the Company's members those matters we are required to state to them in an auditor's report and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the Company and the Company's members, as a body, for our audit work, for this report, or for the opinions we have formed.

#### Pat O'Neill

*for and on behalf of*  
Ernst & Young  
Chartered Accountants and Statutory Audit Firm  
Dublin

28 February 2018



## Independent Auditor's US Reports

### REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and the Board of Directors of CRH public limited company (CRH plc):

#### Opinion on the Financial Statements

We have audited the accompanying Consolidated Balance Sheets of CRH plc (the Company) as of 31 December 2017 and 2016, the related Consolidated Income Statements and Consolidated Statements of Comprehensive Income, Changes in Equity and Cash Flows for each of the three years in the period ended 31 December 2017, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the consolidated financial position of the Company at 31 December 2017 and 2016, and the consolidated results of its operations and its cash flows for each of the three years in the period ended 31 December 2017, in conformity with International Financial Reporting Standards as issued by the International Accounting Standards Board.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of 31 December 2017, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organisations of the Treadway Commission (2013 Framework) and our report dated 28 February 2018 expressed an unqualified opinion thereon.

#### Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

#### ERNST & YOUNG

We have served as the Company's auditor since 1988.

*Dublin, Ireland*

28 February 2018

### REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and the Board of Directors of CRH public limited company (CRH plc):

#### Opinion on Internal Control over Financial Reporting

We have audited CRH plc's internal control over financial reporting as of 31 December 2017, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organisations of the Treadway Commission (2013 Framework) (the "COSO criteria"). In our opinion, CRH plc (the Company) maintained, in all material respects, effective internal control over financial reporting as of 31 December 2017, based on the COSO criteria.

As indicated in the accompanying Management's Report on Internal Control over Financial Reporting, management's assessment of and conclusion on the effectiveness of internal control over financial reporting did not include the internal controls of business combinations during the year ended 31 December 2017, which are included in the 2017 Consolidated Financial Statements of the Company and constituted 6.4% and 10.6% of total and net assets, respectively, as of 31 December 2017 and 1.9% and (0.1)% of revenues (from continuing and discontinued operations) and group profit, respectively, for the year then ended. Our audit of internal control over financial reporting of the Company also did not include an evaluation of the internal control over financial reporting of business combinations completed during the year ended 31 December 2017.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Consolidated Balance Sheets of CRH plc as of 31 December 2017 and 2016, the related Consolidated Income Statements and Consolidated Statements of Comprehensive Income, Changes in Equity and Cash Flows for each of the three years in the period ended 31 December 2017, and the related notes (collectively referred to as the "financial statements") of the Company and our report dated 28 February 2018 expressed an unqualified opinion thereon.

#### Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

#### Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorisations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorised acquisition, use, or disposition of the Company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

#### ERNST & YOUNG

*Dublin, Ireland*

28 February 2018



## Consolidated Income Statement for the financial year ended 31 December 2017

	2017	Restated <sup>(i)</sup> 2016	Restated <sup>(i)</sup> 2015
	€m	€m	€m
Notes			
1 Revenue	25,220	24,789	21,406
3 Cost of sales	(16,903)	(16,566)	(14,743)
Gross profit	8,317	8,223	6,663
3 Operating costs	(6,222)	(6,315)	(5,497)
1,4,6,7 Group operating profit	2,095	1,908	1,166
1,5 Profit on disposals	56	53	99
Profit before finance costs	2,151	1,961	1,265
9 Finance costs	(301)	(325)	(303)
9 Finance income	12	8	8
9 Other financial expense	(60)	(66)	(94)
10 Share of equity accounted investments' profit	65	42	44
1 Profit before tax from continuing operations	1,867	1,620	920
11 Income tax expense	(55)	(431)	(276)
Group profit for the financial year from continuing operations	1,812	1,189	644
2 Profit after tax for the financial year from discontinued operations	107	81	85
Group profit for the financial year	1,919	1,270	729
<i>Profit attributable to:</i>			
Equity holders of the Company			
From continuing operations	1,788	1,162	639
From discontinued operations	107	81	85
Non-controlling interests			
From continuing operations	24	27	5
Group profit for the financial year	1,919	1,270	729
13 Basic earnings per Ordinary Share	226.8c	150.2c	89.1c
13 Diluted earnings per Ordinary Share	225.4c	149.1c	88.7c
13 Basic earnings per Ordinary Share from continuing operations	214.0c	140.4c	78.7c
13 Diluted earnings per Ordinary Share from continuing operations	212.7c	139.4c	78.3c

(i) Restated to show the results of our Americas Distribution segment in discontinued operations. See note 2 for further details.

## Consolidated Statement of Comprehensive Income for the financial year ended 31 December 2017

	2017	2016	2015
	€m	€m	€m
Notes			
Group profit for the financial year	1,919	1,270	729
<b>Other comprehensive income</b>			
<i>Items that may be reclassified to profit or loss in subsequent years:</i>			
Currency translation effects	(1,076)	(82)	661
25 Gains/(losses) relating to cash flow hedges	8	14	(2)
	(1,068)	(68)	659
<i>Items that will not be reclassified to profit or loss in subsequent years:</i>			
28 Remeasurement of retirement benefit obligations	114	(61)	203
11 Tax on items recognised directly within other comprehensive income	(33)	3	(30)
	81	(58)	173
Total other comprehensive income for the financial year	(987)	(126)	832
Total comprehensive income for the financial year	932	1,144	1,561
<i>Attributable to:</i>			
Equity holders of the Company	969	1,128	1,538
Non-controlling interests	(37)	16	23
Total comprehensive income for the financial year	932	1,144	1,561



## Consolidated Balance Sheet as at 31 December 2017

Notes	2017 €m	2016 €m	
<b>ASSETS</b>			
<b>Non-current assets</b>			
14	Property, plant and equipment	13,094	12,690
15	Intangible assets	7,214	7,761
16	Investments accounted for using the equity method	1,248	1,299
16	Other financial assets	25	26
18	Other receivables	156	212
25	Derivative financial instruments	30	53
27	Deferred income tax assets	95	159
	<b>Total non-current assets</b>	<b>21,862</b>	<b>22,200</b>
<b>Current assets</b>			
17	Inventories	2,715	2,939
18	Trade and other receivables	3,630	3,979
	Current income tax recoverable	165	4
25	Derivative financial instruments	34	23
23	Cash and cash equivalents	2,115	2,449
2	Assets held for sale	1,112	-
	<b>Total current assets</b>	<b>9,771</b>	<b>9,394</b>
	<b>Total assets</b>	<b>31,633</b>	<b>31,594</b>
<b>EQUITY</b>			
<b>Capital and reserves attributable to the Company's equity holders</b>			
30	Equity share capital	286	284
30	Preference share capital	1	1
30	Share premium account	6,417	6,237
30	Treasury Shares and own shares	(15)	(14)
	Other reserves	285	286
	Foreign currency translation reserve	(386)	629
	Retained income	7,903	6,472
	<b>Capital and reserves attributable to the Company's equity holders</b>	<b>14,491</b>	<b>13,895</b>
32	Non-controlling interests	486	548
	<b>Total equity</b>	<b>14,977</b>	<b>14,443</b>
<b>LIABILITIES</b>			
<b>Non-current liabilities</b>			
24	Interest-bearing loans and borrowings	7,660	7,515
25	Derivative financial instruments	3	-
27	Deferred income tax liabilities	1,666	2,008
19	Other payables	226	461
28	Retirement benefit obligations	377	591
26	Provisions for liabilities	693	678
	<b>Total non-current liabilities</b>	<b>10,625</b>	<b>11,253</b>
<b>Current liabilities</b>			
19	Trade and other payables	4,534	4,815
	Current income tax liabilities	458	394
24	Interest-bearing loans and borrowings	316	275
25	Derivative financial instruments	11	32
26	Provisions for liabilities	371	382
2	Liabilities associated with assets classified as held for sale	341	-
	<b>Total current liabilities</b>	<b>6,031</b>	<b>5,898</b>
	<b>Total liabilities</b>	<b>16,656</b>	<b>17,151</b>
	<b>Total equity and liabilities</b>	<b>31,633</b>	<b>31,594</b>

N. Hartery, A. Manifold, Directors

## Consolidated Statement of Changes in Equity for the financial year ended 31 December 2017

Notes	Attributable to the equity holders of the Company							Total equity €m
	Issued share capital €m	Share premium account €m	Treasury Shares/ own shares €m	Other reserves €m	Foreign currency translation reserve €m	Retained income €m	Non- controlling interests €m	
<b>At 1 January 2017</b>								
	285	6,237	(14)	286	629	6,472	548	14,443
	-	-	-	-	-	1,895	24	1,919
	-	-	-	-	(1,015)	89	(61)	(987)
	-	-	-	-	(1,015)	1,984	(37)	932
30	1	118	-	-	-	-	-	119
	-	-	-	62	-	-	-	62
30	-	-	2	-	-	(2)	-	-
30	-	-	(3)	-	-	-	-	(3)
30	1	62	-	(63)	-	-	-	-
11	-	-	-	-	-	(5)	-	(5)
12	-	-	-	-	-	(546)	(8)	(554)
31	-	-	-	-	-	-	20	20
	-	-	-	-	-	-	(37)	(37)
	<b>287</b>	<b>6,417</b>	<b>(15)</b>	<b>285</b>	<b>(386)</b>	<b>7,903</b>	<b>486</b>	<b>14,977</b>
<b>At 31 December 2017</b>								
<i>For the financial year ended 31 December 2016</i>								
<b>At 1 January 2016</b>								
	282	6,021	(28)	240	700	5,800	529	13,544
	-	-	-	-	-	1,243	27	1,270
	-	-	-	-	(71)	(44)	(11)	(126)
	-	-	-	-	(71)	1,199	16	1,144
30	3	216	-	-	-	-	-	219
	-	-	-	46	-	-	-	46
30	-	-	18	-	-	(18)	-	-
30	-	-	(4)	-	-	-	-	(4)
11	-	-	-	-	-	12	-	12
12	-	-	-	-	-	(519)	(8)	(527)
31	-	-	-	-	-	-	9	9
	-	-	-	-	-	(2)	2	-
	<b>285</b>	<b>6,237</b>	<b>(14)</b>	<b>286</b>	<b>629</b>	<b>6,472</b>	<b>548</b>	<b>14,443</b>
	<b>282</b>	<b>6,021</b>	<b>(28)</b>	<b>240</b>	<b>700</b>	<b>5,800</b>	<b>529</b>	<b>13,544</b>
<b>At 31 December 2016</b>								
<i>For the financial year ended 31 December 2015</i>								
<b>At 1 January 2015</b>								
	254	4,324	(76)	213	57	5,405	21	10,198
	-	-	-	-	-	724	5	729
	-	-	-	-	643	171	18	832
	-	-	-	-	643	895	23	1,561
	-	-	-	-	-	-	-	-
	28	1,697	-	-	-	-	-	1,725
	-	-	-	27	-	-	-	27
	-	-	51	-	-	(51)	-	-
	-	-	(3)	-	-	-	-	(3)
11	-	-	-	-	-	5	-	5
	-	-	-	-	-	57	-	57
12	-	-	-	-	-	(511)	(4)	(515)
31	-	-	-	-	-	-	489	489
	<b>282</b>	<b>6,021</b>	<b>(28)</b>	<b>240</b>	<b>700</b>	<b>5,800</b>	<b>529</b>	<b>13,544</b>
	<b>254</b>	<b>4,324</b>	<b>(76)</b>	<b>213</b>	<b>57</b>	<b>5,405</b>	<b>21</b>	<b>10,198</b>
	<b>282</b>	<b>6,021</b>	<b>(28)</b>	<b>240</b>	<b>700</b>	<b>5,800</b>	<b>529</b>	<b>13,544</b>
	<b>254</b>	<b>4,324</b>	<b>(76)</b>	<b>213</b>	<b>57</b>	<b>5,405</b>	<b>21</b>	<b>10,198</b>
	<b>282</b>	<b>6,021</b>	<b>(28)</b>	<b>240</b>	<b>700</b>	<b>5,800</b>	<b>529</b>	<b>13,544</b>
	<b>254</b>	<b>4,324</b>	<b>(76)</b>	<b>213</b>	<b>57</b>	<b>5,405</b>	<b>21</b>	<b>10,198</b>
	<b>282</b>	<b>6,021</b>	<b>(28)</b>	<b>240</b>	<b>700</b>	<b>5,800</b>	<b>529</b>	<b>13,544</b>



## Consolidated Statement of Cash Flows

for the financial year ended 31 December 2017

	2017	2016	2015
	€m	€m	€m
<b>Notes</b>			
<b>Cash flows from operating activities</b>			
Profit before tax from continuing operations	1,867	1,620	920
Profit before tax from discontinued operations	146	121	113
Profit before tax	2,013	1,741	1,033
Finance costs (net)	349	383	389
Share of equity accounted investments' profit	(65)	(42)	(44)
Profit on disposals	(59)	(55)	(101)
Group operating profit	2,238	2,027	1,277
Depreciation charge	1,006	1,009	843
Amortisation of intangible assets	66	71	55
Impairment charge	-	23	44
Share-based payment expense	65	46	27
Other (primarily pension payments)	(186)	(65)	(47)
Net movement on working capital and provisions	(209)	56	585
Cash generated from operations	2,980	3,167	2,784
Interest paid (including finance leases)	(317)	(346)	(302)
Corporation tax paid	(474)	(481)	(235)
<b>Net cash inflow from operating activities</b>	<b>2,189</b>	<b>2,340</b>	<b>2,247</b>
<b>Cash flows from investing activities</b>			
Proceeds from disposals (net of cash disposed and deferred proceeds)	222	283	889
Interest received	11	8	8
Dividends received from equity accounted investments	31	40	53
Purchase of property, plant and equipment	(1,044)	(853)	(882)
Acquisition of subsidiaries (net of cash acquired)	(1,841)	(149)	(7,296)
Other investments and advances	(11)	(7)	(19)
Deferred and contingent acquisition consideration paid	(53)	(57)	(59)
<b>Net cash outflow from investing activities</b>	<b>(2,685)</b>	<b>(735)</b>	<b>(7,306)</b>
<b>Cash flows from financing activities</b>			
Proceeds from issue of shares (net)	42	52	1,593
Proceeds from exercise of share options	-	-	57
Transactions involving non-controlling interests	(37)	-	-
Increase in interest-bearing loans, borrowings and finance leases	1,010	600	5,633
Net cash flow arising from derivative financial instruments	169	(5)	47
Premium paid on early debt redemption	(18)	-	(38)
Treasury/own shares purchased	(3)	(4)	(3)
Repayment of interest-bearing loans, borrowings and finance leases	(343)	(2,015)	(2,744)
Dividends paid to equity holders of the Company	(469)	(352)	(379)
Dividends paid to non-controlling interests	(8)	(8)	(4)
<b>Net cash inflow/(outflow) from financing activities</b>	<b>343</b>	<b>(1,732)</b>	<b>4,162</b>
<b>Decrease in cash and cash equivalents</b>	<b>(153)</b>	<b>(127)</b>	<b>(897)</b>
<b>Reconciliation of opening to closing cash and cash equivalents</b>			
Cash and cash equivalents at 1 January	2,449	2,518	3,295
Translation adjustment	(161)	58	120
Decrease in cash and cash equivalents	(153)	(127)	(897)
<b>Cash and cash equivalents at 31 December</b>	<b>2,135</b>	<b>2,449</b>	<b>2,518</b>

## Accounting Policies

(including key accounting estimates and assumptions)

This document constitutes both the Annual Report and the Financial Statements in accordance with the Irish and UK requirements, and the Annual Report on Form 20-F in accordance with the US Securities Exchange Act of 1934.

### Basis of preparation

The Consolidated Financial Statements of CRH plc have been prepared in accordance with International Financial Reporting Standards (IFRS) as adopted by the European Union, which comprise standards and interpretations approved by the International Accounting Standards Board (IASB). IFRS as adopted by the European Union differ in certain respects from IFRS as issued by the IASB. However, the Consolidated Financial Statements for the financial years presented would be no different had IFRS as issued by the IASB been applied. The Consolidated Financial Statements are also prepared in compliance with the Companies Act 2014 and Article 4 of the EU IAS Regulation.

CRH plc, the Parent Company, is a publicly traded limited company incorporated and domiciled in the Republic of Ireland.

The Consolidated Financial Statements, which are presented in euro millions, have been prepared under the historical cost convention as modified by the measurement at fair value of share-based payments, retirement benefit obligations and certain financial assets and liabilities including derivative financial instruments.

The accounting policies set out below have been applied consistently by all of the Group's subsidiaries, joint ventures and associates to all periods presented in these Consolidated Financial Statements.

In accordance with Section 304 of the Companies Act 2014, the Company is availing of the exemption from presenting its individual profit and loss account to the Annual General Meeting and from filing it with the Registrar of Companies.

### Adoption of IFRS and International Financial Reporting Interpretations Committee (IFRIC) interpretations

The Group has applied those new standards and interpretations that apply from 1 January

2017, including the Annual Improvements 2014-2016 Cycle and amendments to IAS 7 *Statement of Cash Flows* and to IAS 12 *Income Taxes*. These amendments principally related to clarifications and presentation and their application did not result in material changes to the Group's Consolidated Financial Statements.

### IFRS and IFRIC interpretations being adopted in subsequent years

The Group has formed a number of project teams to evaluate and implement the following standards:

#### IFRS 9 *Financial Instruments*

IFRS 9 *Financial Instruments* addresses the classification, measurement and derecognition of financial assets and financial liabilities, introduces new rules for hedge accounting and a new impairment model for financial assets. The Group will adopt IFRS 9 on 1 January 2018 in accordance with the transition provisions of the standard.

The new impairment model requires the recognition of impairment provisions based on expected credit losses (ECL) rather than only incurred credit losses as is the case under IAS 39 *Financial Instruments: Recognition and Measurement*. Overall, the Group expects no material impact on the Consolidated Financial Statements. This assessment is based on internally available information and may be subject to change arising from further reasonable and supportable information being made available to the Group in 2018 when the Group adopts the new standard.

The new hedge accounting rules will align the accounting for hedging instruments more closely with the Group's risk management practices. As a general rule, more hedge relationships may be eligible for hedge accounting, as the standard introduces a more principles-based approach.

The new standard also introduces expanded disclosure requirements and changes in presentation. These are expected to change the nature and extent of the Group's disclosures about its financial instruments particularly in the first year of adoption of the new standard.

#### IFRS 15 *Revenue from Contracts with Customers*

IFRS 15 *Revenue from Contracts with Customers* will replace IAS 18 *Revenue*, IAS 11 *Construction Contracts* and related interpretations. The new standard is applicable from 1 January 2018. IFRS 15 introduces a number of new concepts and requirements and also provides guidance and clarification on existing practice. CRH will adopt IFRS 15 by applying the modified retrospective application.

Throughout 2017, the Group performed a detailed analysis of the impact of IFRS 15; including a review of our contracts and sales arrangements. At this point, we have concluded that there is no material impact arising from transition to IFRS 15. Opening retained earnings for 2018 will not be adjusted as a result.

Revenue derived from sources other than construction contracts will continue to be recognised at a point in time.

Revenue earned in our construction contract businesses will continue to be recognised over time; principally using an input method.

The Group's transition project had the following focus areas:

#### (i) Variable consideration

Some contracts with customers offer trade discounts or volume rebates. Our construction contracts can include certain bonuses and other variable consideration clauses. Based on the detailed procedures performed during 2017, a material impact on the recognition of such variable consideration under IFRS 15 has not been identified.

#### (ii) Warranty obligations

Warranties currently offered by the Group will continue to be accounted for under IAS 37 *Provisions, Contingent Liabilities and Contingent Assets*.

#### (iii) Bundling and unbundling of contracts to determine performance obligations

The vast majority of our contracts contain just one performance obligation. Within our construction contract businesses, some contracts have been identified as offering two promises to a customer; however the adoption of IFRS 15 will not have a material impact on the recognition of revenue on these contracts.



## Accounting Policies - continued

### (iv) Loss-making contracts

Loss-making contracts will now be accounted for under IAS 37 rather than under IAS 11. This will not have an impact on revenue recognition at transition.

### (v) Principal versus agent considerations

We examined whether any revenue might be deemed to be more appropriately recorded on an agency or net basis, rather than on a gross basis, under IFRS 15 and determined that no material impact on the Group's revenue arose.

### (vi) Disclosure requirements

IFRS 15 disclosure requirements are more detailed than under current IFRS. The Group is in the process of finalising the disclosures required to be reported in 2018.

### IFRS 16 Leases

IFRS 16 *Leases* was issued in January 2016 and replaces IAS 17 *Leases*, IFRIC 4 *Determining Whether an Arrangement Contains a Lease*, SIC-15 – *Operating Leases – Incentives and SIC-27 – Evaluating the Substance of Transactions Involving the Legal Form of a Lease*. The new standard is applicable from 1 January 2019.

IFRS 16 sets out the principles for the recognition, measurement, presentation and disclosure of leases and requires lessees to account for the majority of leases under a single on-balance sheet model, similar to the accounting for finance leases under IAS 17. The standard includes two recognition exemptions for lessees – leases of 'low-value' assets (e.g. personal computers) and short-term leases (i.e. leases with a term of 12 months or less). It also includes an election which permits a lessee not to separate non-lease components (e.g. maintenance) from lease components and instead capitalise both the lease cost and associated non-lease cost.

At the commencement date of a lease, a lessee will recognise a liability to make lease payments (i.e. the lease liability) and an asset representing the right to use the underlying asset during the lease term (i.e. the right-of-use asset). Lessees will be required to separately recognise the interest expense on the lease liability and the depreciation expense on the right-of-use asset. Under IFRS 16 lessees will also be required to remeasure the lease liability upon the occurrence of certain events (e.g. a change in lease term or a change in future lease payments resulting from a change in an index or rate used to determine those payments). The lessee will generally recognise the amount of the

remeasurement of the lease liability as an adjustment to the right-of-use asset.

CRH has entered into operating leases for a range of assets, principally relating to property across the US and Europe. These property leases have varying terms, escalation clauses and renewal rights including periodic rent reviews linked with a consumer price index and/or other indices. The Group also leases plant and machinery, vehicles and equipment under operating leases.

The adoption of the new standard will have a material impact on the Group's Consolidated Financial Statements, as follows:

### Income Statement

Operating expenses will decrease, as the Group currently recognises operating lease expenses in either cost of sales, selling and distribution or administration expenses (depending on the nature of the lease). The Group's lease expense (continuing operations) for 2017 was €606 million and is disclosed in note 4 to the Consolidated Financial Statements.

Depreciation and finance costs as currently reported in the Group's Income Statement will increase, as under the new standard the right-of-use asset will be capitalised and depreciated over the term of the lease with an associated finance cost applied annually to the lease liability.

### Balance Sheet

At transition date, the Group will determine the lease payments outstanding at that date and apply the appropriate discount rate to calculate the present value of the lease payments. CRH is currently considering adopting the new standard by applying the modified retrospective approach. In addition, CRH will perform an impairment assessment at date of adoption and any resulting impairment will impact retained earnings rather than the Consolidated Income Statement in the year of transition.

The Group's commitment outstanding on all leases (including those relating to discontinued operations) as at 31 December 2017 is €2,191 million (2016: €2,171 million) (see note 29 to the Consolidated Financial Statements).

The Group has been assessing the impact of the new standard since it was issued in January 2016. The exact financial impact of the standard is as yet unknown, as a number of factors impact the calculation of the liability, such as discount rate and the expected term of leases including renewal options.

The Group's commitment as at 31 December 2017 provides an indication of the scale of leases held and how significant leases currently are to CRH's business. The Group will continue to assess its portfolio of leases to calculate the impending impact of transition to the new standard during 2018.

In addition to the impacts above, there will also be significantly increased disclosures when the Group adopts IFRS 16.

### IFRIC 23 *Uncertainty over Income Tax Treatments*

IFRIC 23 was issued in June 2017; with an effective date of 1 January 2019. It clarifies the accounting for uncertainties in income taxes. The Group is currently evaluating the impact of this interpretation on future periods.

### IAS 19 *Employee Benefits*

In February 2018, the IASB issued a narrow scope amendment to IAS 19 *Employee Benefits*. The amendment will be applied prospectively for plan amendments, curtailments or settlements occurring on or after 1 January 2019. These amendments are not expected to have an impact on the Group on the effective date, but will impact how the Group determines current service cost and net interest in the event of any plan amendments, curtailments or settlements which arise thereafter.

### IFRS 17 *Insurance Contracts*

In May 2017, the IASB issued IFRS 17 *Insurance Contracts*. IFRS 17 is effective for reporting periods beginning on or after 1 January 2021, with presentation of comparative figures required. This standard is not expected to have an impact on the Group.

There are no other IFRS or IFRIC interpretations that are effective subsequent to the CRH 2017 financial year-end that would have a material impact on the results or financial position of the Group.

## Key Accounting Policies which involve Estimates, Assumptions and Judgements

The preparation of the Consolidated Financial Statements in accordance with IFRS requires management to make certain estimates, assumptions and judgements that affect the application of accounting policies and the reported amounts of assets, liabilities, income

and expenses. Management believes that the estimates, assumptions and judgements upon which it relies are reasonable based on the information available to it at the time that those estimates, assumptions and judgements are made. In some cases, the accounting treatment of a particular transaction is specifically dictated by IFRS and does not require management's judgement in its application.

Management considers that their use of estimates, assumptions and judgements in the application of the Group's accounting policies are inter-related and therefore discuss them together below.

Estimates, and underlying assumptions, are reviewed on an ongoing basis. Changes in accounting estimates may be necessary if there are changes in the circumstances or experiences on which the estimate was based or as a result of new information.

The critical accounting policies which involve significant estimates, assumptions or judgements, the actual outcome of which could have a material impact on the Group's results and financial position outlined below, are as follows:

### Impairment of long-lived assets and goodwill – Notes 14 and 15

#### Impairment of property, plant and equipment and goodwill

The carrying values of items of property, plant and equipment are reviewed for indicators of impairment at each reporting date and are subject to impairment testing when events or changes in circumstances indicate that the carrying values may not be recoverable. Goodwill is subject to impairment testing on an annual basis and at any time during the year if an indicator of impairment is considered to exist. A decision to dispose of a business unit represents one such indicator and in these circumstances the recoverable amount is assessed on a fair value less costs of disposal basis. In the year in which a business combination is effected and where some or all of the goodwill allocated to a particular cash-generating unit arose in respect of that combination, the cash-generating unit is tested for impairment prior to the end of the relevant annual period.

Property, plant and equipment assets are reviewed for potential impairment by applying a series of external and internal indicators specific to the assets under consideration; these indicators encompass macroeconomic issues including the inherent cyclicity of the building materials sector, actual obsolescence or

physical damage, a deterioration in forecast performance in the internal reporting cycle and restructuring and rationalisation programmes.

Where the carrying value exceeds the estimated recoverable amount (being the greater of fair value less costs of disposal and value-in-use), an impairment loss is recognised by writing down the assets to their recoverable amount. In assessing value-in-use, the estimated future cash flows are discounted to their present value using a pre-tax discount rate that reflects current market assessments of the time value of money and the risks specific to the asset for which the future cash flow estimates have not been adjusted. The estimates of future cash flows exclude cash inflows or outflows attributable to financing activities and income tax. For an asset that does not generate largely independent cash inflows, the recoverable amount is determined by reference to the cash-generating unit to which the asset belongs. Impairment losses arising in respect of goodwill are not reversed once recognised.

Goodwill relating to associates and joint ventures is included in the carrying amount of the investment and is neither amortised nor individually tested for impairment. Where indicators of impairment of an investment arise in accordance with the requirements of IAS 39, the carrying amount is tested for impairment by comparing its recoverable amount with its carrying amount.

The impairment testing process requires management to make significant judgements and estimates regarding the future cash flows expected to be generated by the use of and, if applicable, the eventual disposal of, long-lived assets and goodwill as well as other factors to determine the fair value of the assets. Management periodically evaluates and updates the estimates based on the conditions which influence these variables. A detailed discussion of the impairment methodology applied and key assumptions used by the Group in the context of long-lived assets and goodwill is provided in note 15 to the Consolidated Financial Statements.

The assumptions and conditions for determining impairments of long-lived assets and goodwill reflect management's best assumptions and estimates, but these items involve inherent uncertainties described above, many of which are not under management's control. As a result, the accounting for such items could result in different estimates or amounts if management used different assumptions or if different conditions occur in future accounting periods.

### Retirement benefit obligations – Note 28

Costs arising in respect of the Group's defined contribution pension schemes are charged to the Consolidated Income Statement in the period in which they are incurred. The Group has no legal or constructive obligation to pay further contributions in the event that the fund does not hold sufficient assets to meet its benefit commitments.

The liabilities and costs associated with the Group's defined benefit pension schemes (both funded and unfunded) are assessed either on the basis of the attained age, the projected unit credit, the current unit credit or the aggregate cost methods by professionally qualified actuaries and are arrived at using actuarial assumptions based on market expectations at the balance sheet date. The discount rates employed in determining the present value of the schemes' liabilities are determined by reference to market yields at the balance sheet date on high-quality corporate bonds of a currency and term consistent with the currency and term of the associated post-employment benefit obligations.

The net surplus or deficit arising on the Group's defined benefit pension schemes, together with the liabilities associated with the unfunded schemes, are shown either within non-current assets or non-current liabilities in the Consolidated Balance Sheet. The deferred tax impact of pension scheme surpluses and deficits is disclosed separately within deferred tax assets or liabilities as appropriate. Remeasurements, comprising actuarial gains and losses and the return on plan assets (excluding net interest), are recognised immediately in the Consolidated Balance Sheet with a corresponding debit or credit to retained earnings through other comprehensive income in the period in which they occur. Remeasurements are not reclassified to profit or loss in subsequent periods.

The defined benefit pension asset or liability in the Consolidated Balance Sheet comprises the total for each plan of the present value of the defined benefit obligation less the fair value of plan assets out of which the obligations are to be settled directly. Plan assets are assets that are held by a long-term employee benefit fund or qualifying insurance policies. Fair value is based on market price information and, in the case of published securities; it is the published bid price. The value of any defined benefit asset is limited to the present value of any economic benefits available in the form of refunds from the plan and reductions in the future contributions to the plan.



## Accounting Policies - continued

The Group's obligation in respect of post-employment healthcare and life assurance benefits represents the amount of future benefit that employees have earned in return for service in the current and prior periods. The obligation is computed on the basis of the projected unit credit method and is discounted to present value using a discount rate equating to the market yield at the balance sheet date on high-quality corporate bonds of a currency and term consistent with the currency and estimated term of the post-employment obligations.

### Assumptions

The assumptions underlying the actuarial valuations (including discount rates, rates of increase in future compensation levels, mortality rates and healthcare cost trends), from which the amounts recognised in the Consolidated Financial Statements are determined, are updated annually based on current economic conditions and for any relevant changes to the terms and conditions of the pension and post-retirement plans. These assumptions can be affected by (i) for the discount rate, changes in the rates of return on high-quality corporate bonds; (ii) for future compensation levels, future labour market conditions and (iii) for healthcare cost trend rates, the rate of medical cost inflation in the relevant regions. The weighted average actuarial assumptions used and sensitivity analysis in relation to the significant assumptions employed in the determination of pension and other post-retirement liabilities are contained in note 28 to the Consolidated Financial Statements.

While management believes that the assumptions used are appropriate, differences in actual experience or changes in assumptions may affect the obligations and expenses recognised in future accounting periods. The assets and liabilities of defined benefit pension schemes may exhibit significant period-on-period volatility attributable primarily to changes in bond yields and longevity. In addition to future service contributions, significant cash contributions may be required to remediate past service deficits. A sensitivity analysis of the change in these assumptions is provided in note 28.

### Provisions for liabilities – Note 26

A provision is recognised when the Group has a present obligation (either legal or constructive) as a result of a past event, it is probable that a transfer of economic benefits will be required to settle the obligation and a reliable estimate can be made of the amount of the obligation.

Where the Group anticipates that a provision will be reimbursed, the reimbursement is recognised as a separate asset only when it is virtually certain that the reimbursement will arise. The expense relating to any provision is presented in the Consolidated Income Statement net of any reimbursement. Provisions are measured at the present value of the expenditures expected to be required to settle the obligation. The increase in the provision due to passage of time is recognised as an interest expense. Contingent liabilities arising on business combinations are recognised as provisions if the contingent liability can be reliably measured at its acquisition date fair value. Provisions are not recognised for future operating losses. Refer to note 26 for the expected timing of outflows by provisions category.

### Environmental and remediation provisions

The measurement of environmental and remediation provisions is based on an evaluation of currently available facts with respect to each individual site and considers factors such as existing technology, currently enacted laws and regulations and prior experience in remediation of sites. Inherent uncertainties exist in such evaluations primarily due to unknown conditions, changing governmental regulations and legal standards regarding liability, the protracted length of the clean-up periods and evolving technologies. The environmental and remediation liabilities provided for in the Consolidated Financial Statements reflect the information available to management at the time of determination of the liability and are adjusted periodically as remediation efforts progress or as additional technical or legal information becomes available. Due to the inherent uncertainties described above, many of which are not under management's control, the accounting for such items could result in different amounts if management used different assumptions or if different conditions occur in future accounting periods.

### Legal contingencies

The status of each significant claim and legal proceeding in which the Group is involved is reviewed by management on a periodic basis and the Group's potential financial exposure is assessed. If the potential loss from any claim or legal proceeding is considered probable, and the amount can be estimated, a liability is recognised for the estimated loss. Because of the uncertainties inherent in such matters, the related provisions are based on the best information available at the time; the issues taken into account by management and factored into the assessment of legal contingencies include, as applicable, the status

of settlement negotiations, interpretations of contractual obligations, prior experience with similar contingencies/claims, the availability of insurance to protect against the downside exposure and advice obtained from legal counsel and other third parties. As additional information becomes available on pending claims, the potential liability is reassessed and revisions are made to the amounts accrued where appropriate. Such revisions in the estimates of the potential liabilities could have a material impact on the results of operations and financial position of the Group in future accounting periods.

### Taxation – current and deferred – Notes 11 and 27

Current tax represents the expected tax payable (or recoverable) on the taxable profit for the year using tax rates enacted for the period. Any interest or penalties arising are included within current tax. Where items are accounted for outside of profit or loss, the related income tax is recognised either in other comprehensive income or directly in equity as appropriate.

Deferred tax is recognised using the liability method on temporary differences arising at the balance sheet date between the tax bases of assets and liabilities and their carrying amounts in the Consolidated Financial Statements. However, deferred tax liabilities are not recognised if they arise from the initial recognition of goodwill; in addition, deferred income tax is not accounted for if it arises from initial recognition of an asset or liability in a transaction other than a business combination that at the time of the transaction affects neither accounting nor taxable profit or loss. For the most part, no provision has been made for temporary differences applicable to investments in subsidiaries and joint ventures as the Group is in a position to control the timing of reversal of the temporary differences and it is probable that the temporary differences will not reverse in the foreseeable future. However, a temporary difference has been recognised to the extent that specific assets have been identified for sale or where there is a specific intention to unwind the temporary difference in the foreseeable future. Due to the absence of control in the context of associates (significant influence only), deferred tax liabilities are recognised where appropriate in respect of CRH's investments in these entities on the basis that the exercise of significant influence would not necessarily prevent earnings being remitted by other shareholders in the undertaking.

Deferred tax is determined using tax rates (and laws) that have been enacted or substantially enacted by the balance sheet date and are expected to apply when the related deferred income tax asset is realised or the deferred income tax liability is settled. Deferred tax assets and liabilities are not subject to discounting. Deferred tax assets are recognised in respect of all deductible temporary differences, carry-forward of unused tax credits and unused tax losses to the extent that it is probable that taxable profits will be available against which the temporary differences can be utilised. The carrying amounts of deferred tax assets are subject to review at each balance sheet date and are reduced to the extent that future taxable profits are considered to be inadequate to allow all or part of any deferred tax asset to be utilised.

The Group's income tax charge is based on reported profit and expected statutory tax rates, which reflect various allowances and reliefs and tax planning opportunities available to the Group in the multiple tax jurisdictions in which it operates. The determination of the Group's provision for income tax requires certain judgements and estimates in relation to matters where the ultimate tax outcome may not be certain. The recognition or non-recognition of deferred tax assets as appropriate also requires judgement as it involves an assessment of the future recoverability of those assets. In addition, the Group is subject to tax audits which can involve complex issues that could require extended periods to conclude, the resolution of which is often not within the control of the Group. Although management believes that the estimates included in the Consolidated Financial Statements and its tax return positions are reasonable, there is no certainty that the final outcome of these matters will not be different than that which is reflected in the Group's historical income tax provisions and accruals. Whilst it is possible, the Group does not currently anticipate that any such differences could have a material impact on the income tax provision and profit for the period in which such a determination is made nor does it expect any significant impact on its financial position in the near term. This is based on the Group's knowledge and experience, as well as the profile of the individual components which have been reflected in the current tax liability, the status of the tax audits, enquiries and negotiations in progress at each year-end, previous claims and any factors specific to the relevant tax environments.

## Other Significant Accounting Policies

### Basis of consolidation

The Consolidated Financial Statements include the financial statements of the Parent Company and all subsidiaries, joint ventures and associates, drawn up to 31 December each year. The financial year-ends of the Group's subsidiaries, joint ventures and associates are co-terminous.

### Subsidiaries

Subsidiaries are all entities over which the Group has control. The Group controls an entity when the Group is exposed to, or has rights to, variable returns from its involvement with the entity and has the ability to affect those returns through its power over the entity. Subsidiaries are fully consolidated from the date on which control is transferred to the Group. They are deconsolidated from the date that control ceases. A change in the ownership interest of a subsidiary without a change in control is accounted for as an equity transaction.

When the Group holds less than the majority of voting rights, other facts and circumstances including contractual arrangements that give the Group power over the investee may result in the Group controlling the investee. The Group reassesses whether it controls an investee if, and when, facts and circumstances indicate that there are changes to the elements evidencing control.

Non-controlling interests represent the portion of the equity of a subsidiary not attributable either directly or indirectly to the Parent Company and are presented separately in the Consolidated Income Statement and within equity in the Consolidated Balance Sheet, distinguished from Parent Company shareholders' equity. Acquisitions of non-controlling interests are accounted for as transactions with equity holders in their capacity as equity holders and therefore no goodwill is recognised as a result of such transactions. On an acquisition by acquisition basis, the Group recognises any non-controlling interest in the acquiree either at fair value or at the non-controlling interest's proportionate share of the acquiree's net assets.

## Investments in associates and joint ventures – Notes 10 and 16

An associate is an entity over which the Group has significant influence. Significant influence is the power to participate in the financial and operating policy decisions of an entity, but is not control or joint control over those policies.

A joint venture is a type of joint arrangement whereby the parties that have joint control of the arrangement have rights to the net assets of the joint venture. Joint control is the contractually agreed sharing of control of the arrangement, which exists only when decisions about the relevant activities require unanimous consent of the parties sharing control.

The Group's investments in its associates and joint ventures are accounted for using the equity method from the date significant influence/joint control is deemed to arise until the date on which significant influence/joint control ceases to exist or when the interest becomes classified as an asset held for sale.

The Consolidated Income Statement reflects the Group's share of profit after tax of the related associates and joint ventures. Investments in associates and joint ventures are carried in the Consolidated Balance Sheet at cost adjusted in respect of post-acquisition changes in the Group's share of net assets, less any impairment in value. Loans advanced to equity accounted investments that have the characteristics of equity financing are also included in the investment held on the Consolidated Balance Sheet. If necessary, impairment losses on the carrying amount of an investment are reported within the Group's share of equity accounted investments results in the Consolidated Income Statement. If the Group's share of losses exceeds the carrying amount of an associate or joint venture, the carrying amount is reduced to nil and recognition of further losses is discontinued except to the extent that the Group has incurred obligations in respect of the associate or joint venture.

## Property, plant and equipment – Note 14

The carrying value of property, plant and equipment of €13,094 million at 31 December 2017 represents 41% of total assets at that date. Property, plant and equipment are stated at cost less any accumulated depreciation and any accumulated impairments except for certain items that had been revalued to fair value prior to the date of transition to IFRS (1 January 2004).



## Accounting Policies - continued

Repair and maintenance expenditure is included in an asset's carrying amount or recognised as a separate asset, as appropriate, only when it is probable that future economic benefits associated with the item will flow to the Group and the cost of the item can be measured reliably. All other repair and maintenance expenditure is charged to the Consolidated Income Statement during the financial period in which it is incurred.

Borrowing costs incurred in the construction of major assets which take a substantial period of time to complete are capitalised in the financial period in which they are incurred.

In the application of the Group's accounting policy, judgement is exercised by management in the determination of residual values and useful lives. Depreciation and depletion is calculated to write off the book value of each item of property, plant and equipment over its useful economic life on a straight-line basis at the following rates:

*Land and buildings:* The book value of mineral-bearing land, less an estimate of its residual value, is depleted over the period of the mineral extraction in the proportion which production for the year bears to the latest estimates of proven and probable mineral reserves. Land, other than mineral-bearing land, is not depreciated. In general, buildings are depreciated at 2.5% per annum ("p.a.").

*Plant and machinery:* These are depreciated at rates ranging from 3.3% p.a. to 20% p.a. depending on the type of asset. Plant and machinery includes transport which is, on average, depreciated at 20% p.a.

Depreciation methods, useful lives and residual values are reviewed at each financial year-end. Changes in the expected useful life or the expected pattern of consumption of future economic benefits embodied in the asset are accounted for by changing the depreciation period or method as appropriate on a prospective basis. For the Group's accounting policy on impairment of property, plant and equipment, please see impairment of long-lived assets and goodwill.

### Revenue recognition

Revenue represents the value of goods and services supplied and is net of trade discounts and value added tax/sales tax. Other than in the case of construction contracts, revenue is recognised to the extent that revenue and related costs incurred or to be incurred are subject to reliable measurement, that it is probable that economic benefits will flow to the

Group and that the significant risks and rewards of ownership have passed to the buyer, usually on delivery of the goods.

### Construction contracts

The Group engages primarily in the performance of fixed price contracts, as opposed to cost plus contracts. Contract costs are recognised as incurred.

When the outcome of a contract can be estimated reliably the Group recognises revenue in accordance with the percentage-of-completion or measured works to date methods. The completion percentage is generally measured based on the proportion of contract costs incurred at the balance sheet date relative to the total estimated costs of the contract. When the outcome of a construction contract cannot be estimated reliably, contract revenue is recognised only to the extent of contract costs incurred where it is probable that these costs will be recoverable.

When it is probable that total contract costs will exceed total contract revenue, the expected loss is recognised immediately as an expense. Revenue and/or costs in respect of variations or contracts claims and incentive payments, to the extent that they arise, are recognised when it is probable that the amount, which can be measured reliably, will be recovered from/paid to the customer.

If circumstances arise that may change the original estimates of revenues, costs or extent of progress towards completion, estimates are revised. These revisions may result in increases or decreases in revenue or costs and are reflected in income in the period in which the circumstances that give rise to the revision became known by management.

### Segment reporting – Note 1

Operating segments are reported in a manner consistent with the internal organisational and management structure and the internal reporting information provided to the Chief Operating Decision Maker who is responsible for allocating resources and assessing performance of the operating segments.

### Assets and liabilities held for sale – Note 2

Non-current assets and disposal groups classified as held for sale are measured at the lower of carrying amount and fair value less costs to sell.

Non-current assets and disposal groups are classified as held for sale if their carrying amounts will be recovered through a sale transaction rather than through continuing use. This condition is regarded as met only when the sale is highly probable and the asset or disposal group is available for immediate sale in its present condition subject only to terms that are usual and customary for sales of such assets. Management must be committed to the sale, which should be expected to qualify for recognition as a completed sale within 12 months from the date of classification as held for sale.

Property, plant and equipment and intangible assets are not depreciated or amortised once classified as held for sale. The Group ceases to use the equity method of accounting from the date on which an interest in a joint venture or associate becomes held for sale. Non-current assets classified as held for sale and liabilities directly associated with those assets are presented separately as current items in the Consolidated Balance Sheet.

### Discontinued operations – Note 2

Discontinued operations are reported when a component of the Group has been disposed of, or when a sale is highly probable; and its operations and cash flows can be clearly distinguished, operationally and for financial reporting purposes, from the rest of the Group and is classified as held for sale or has been disposed of. The Group classifies a non-current asset or disposal group as held for disposal if its carrying value will be recovered through a sales transaction or distribution to shareholders rather than continuing use.

In the Consolidated Income Statement, discontinued operations are excluded from the results of continuing operations and are presented as a single amount as profit or loss after tax from discontinued operations. Corresponding notes to the Consolidated Income Statement exclude amounts for discontinued operations, unless stated otherwise.

### Prior year information

The presentation of certain prior year information has been reclassified to conform to the current year presentation. The presentation of financial information pertaining to discontinued operations has been restated retrospectively (including the Consolidated Income Statement and corresponding prior year income statement notes).

### Share-based payments – Note 8

The Group operates a number of equity-settled share-based payment plans. Its policy in relation to the granting of share options and awards under these plans, together with the nature of the underlying market and non-market performance and other vesting conditions, are addressed in the Directors' Remuneration Report on page 72. The Group has no material exposure in respect of cash-settled share-based payment transactions and share-based payment transactions with cash alternatives.

### Awards under the Performance Share Plans

50% of the awards granted in 2017 and 2016 under the 2014 Performance Share Plan are subject to a TSR (and hence market-based) vesting condition; with 25% being measured against a tailored sector peer group and 25% against the FTSE All-World Construction & Materials index. The awards made in 2015 are subject to a TSR on 75% of the grant. Accordingly, the fair value assigned to the related equity instruments at the grant date is derived using a Monte Carlo simulation technique to model the combination of market-based and non-market-based performance conditions in the Plans; and is adjusted to reflect the anticipated likelihood as at the grant date of achieving the vesting condition. Awards are treated as vesting irrespective of whether or not the market condition is satisfied, provided that all other performance and/or service conditions are satisfied.

The remaining awards granted under the 2014 Performance Share Plan are subject to a cumulative cash flow target (non-market-based) vesting condition. The fair value of the awards is calculated as the market price of the shares at the date of grant. No expense is recognised for awards that do not ultimately vest. At the balance sheet date the estimate of the level of vesting is reviewed and any adjustment necessary is recognised in the Consolidated Income Statement.

Awards which vest under the 2014 Performance Share Plan are allotted to an Employee Benefit Trust. An increase in nominal Share Capital and Share Premium are recognised accordingly on allotment.

### Savings-related Share Option Scheme

The fair values assigned to options under the Savings-related Share Option Scheme are derived in accordance with the trinomial valuation methodology on the basis that the services to be rendered by employees as consideration for the granting of share options will be received over the vesting period, which is assessed as at the grant date.

The cost is recognised, together with a corresponding increase in equity, over the period in which the performance and/or service conditions are fulfilled. The cumulative expense recognised at each reporting date until the vesting date reflects the extent to which the vesting period has expired and the Group's best estimate of the number of equity instruments that will ultimately vest. The Consolidated Income Statement expense/credit for a period represents the movement in cumulative expense recognised at the beginning and end of that period. The cumulative charge to the Consolidated Income Statement is reversed only where an employee in receipt of share options leaves service prior to completion of the expected vesting period and those options forfeit in consequence.

Where an award is cancelled, it is treated as if it is vested on the date of cancellation, and any expense not yet recognised for the award is recognised immediately. This includes any award where non-vesting conditions within the control of either the Company or the employee are not met. All cancellations of awards are treated equally.

The proceeds received net of any directly attributable transaction costs are credited to share capital (nominal value) and share premium when the options are exercised.

The dilutive effect of outstanding options is reflected as additional share dilution in the determination of diluted earnings per share.

### Business combinations – Note 31

The Group applies the acquisition method in accounting for business combinations. The cost of an acquisition is measured as the aggregate of the consideration transferred (excluding amounts relating to the settlement of pre-existing relationships), the amount of any non-controlling interest in the acquiree and, in a business combination achieved in stages, the acquisition-date fair value of the acquirer's previously-held equity interest in the acquiree.

Transaction costs that the Group incurs in connection with a business combination are expensed as incurred.

To the extent that settlement of all or any part of consideration for a business combination is deferred, the fair value of the deferred component is determined through discounting the amounts payable to their present value at the date of exchange. The discount component is unwound as an interest charge in the Consolidated Income Statement over the life of the obligation. Any contingent consideration is recognised at fair value at the acquisition date and included in the cost of the acquisition. The fair value of contingent consideration at acquisition date is arrived at through discounting the expected payment (based on scenario modelling) to present value. In general, in order for contingent consideration to become payable, pre-defined profit and/or profit/net asset ratios must be exceeded. Subsequent changes to the fair value of the contingent consideration will be recognised in profit or loss unless the contingent consideration is classified as equity, in which case it is not remeasured and settlement is accounted for within equity.

The assets and liabilities arising on business combination activity are measured at their acquisition-date fair values. Contingent liabilities assumed in business combination activity are recognised as of the acquisition date, where such contingent liabilities are present obligations arising from past events and their fair value can be measured reliably. In the case of a business combination achieved in stages, the acquisition-date fair value of the acquirer's previously-held equity interest in the acquiree is remeasured to fair value as at the acquisition date through profit or loss. When the initial accounting for a business combination is determined provisionally, any adjustments to the provisional values allocated to the consideration, identifiable assets or liabilities (and contingent liabilities, if relevant) are made within the measurement period, a period of no more than one year from the acquisition date.

### Goodwill – Note 15

Goodwill arising on a business combination is initially measured at cost, being the excess of the cost of an acquisition over the net identifiable assets and liabilities assumed at the date of acquisition and relates to the future economic benefits arising from assets which are not capable of being individually identified and separately recognised. Following initial recognition, goodwill is measured at cost less any accumulated impairment losses. If the cost of the acquisition is lower than the fair value of the net assets of the subsidiary acquired, the





## Accounting Policies - continued

identification and measurement of the related assets and liabilities and contingent liabilities are revisited and the cost is reassessed with any remaining balance recognised immediately in the Consolidated Income Statement.

The carrying amount of goodwill in respect of associates and joint ventures is included in investments accounted for using the equity method (i.e. within financial assets) in the Consolidated Balance Sheet.

Where a subsidiary is disposed of or terminated through closure, the carrying value of any goodwill of that subsidiary is included in the determination of the net profit or loss on disposal/termination.

### Intangible assets (other than goodwill) arising on business combinations – Note 15

An intangible asset is capitalised separately from goodwill as part of a business combination at cost (fair value at date of acquisition).

Subsequent to initial recognition, intangible assets are carried at cost less any accumulated amortisation and any accumulated impairment losses. The carrying values of definite-lived intangible assets (the Group does not currently have any indefinite-lived intangible assets other than goodwill) are reviewed for indicators of impairment at each reporting date and are subject to impairment testing when events or changes in circumstances indicate that the carrying values may not be recoverable.

Intangible assets are amortised on a straight-line basis. In general, definite-lived intangible assets are amortised over periods ranging from one to ten years, depending on the nature of the intangible asset.

Amortisation periods, useful lives, expected periods of consumption and residual values are reviewed at each financial year-end. Changes in the expected useful life or the expected pattern of consumption of future economic benefits embodied in the asset are accounted for by changing the amortisation period or method as appropriate on a prospective basis.

### Leases – Notes 4 and 29

Leases where the lessor retains substantially all the risks and rewards of ownership are classified as operating leases. Operating lease rentals are charged to the Consolidated Income Statement on a straight-line basis over the lease term.

### Inventories and construction contracts – Note 17

Inventories are stated at the lower of cost and net realisable value. Cost is based on the first-in, first-out principle (and weighted average, where appropriate) and includes all expenditure incurred in acquiring the inventories and bringing them to their present location and condition. Raw materials are valued on the basis of purchase cost on a first-in, first-out basis. In the case of finished goods and work-in-progress, cost includes direct materials, direct labour and attributable overheads based on normal operating capacity and excludes borrowing costs.

Net realisable value is the estimated proceeds of sale less all further costs to completion, and less all costs to be incurred in marketing, selling and distribution. Estimates of net realisable value are based on the most reliable evidence available at the time the estimates are made, taking into consideration fluctuations of price or cost directly relating to events occurring after the end of the period, the likelihood of short-term changes in buyer preferences, product obsolescence or perishability (all of which are generally low given the nature of the Group's products) and the purpose for which the inventory is held. Materials and other supplies held for use in the production of inventories are not written down below cost if the finished goods, in which they will be incorporated, are expected to be sold at or above cost.

Amounts recoverable on construction contracts, which are included in receivables, are stated at the net invoiced value of the work done less amounts received as progress payments on account. Cumulative costs incurred, net of amounts transferred to cost of sales, after deducting foreseeable losses, provisions for contingencies and payments on account not matched with revenue, are included as construction contract balances in inventories. Cost includes all expenditure directly related to specific projects and an allocation of fixed and variable overheads incurred in the Group's contract activities based on normal operating capacity.

### Cash and cash equivalents – Note 23

Cash and cash equivalents comprise cash balances held for the purpose of meeting short-term cash commitments and investments which are readily convertible to a known amount of cash and are subject to an insignificant risk of change in value. Bank overdrafts are included within current interest-bearing loans and

borrowings in the Consolidated Balance Sheet. Where the overdrafts are repayable on demand and form an integral part of cash management, they are netted against cash and cash equivalents for the purposes of the Consolidated Statement of Cash Flows.

### Interest-bearing loans and borrowings – Note 24

All loans and borrowings are initially recorded at the fair value of the consideration received net of directly attributable transaction costs. Subsequent to initial recognition, current and non-current interest-bearing loans and borrowings are, in general, measured at amortised cost employing the effective interest methodology. Fixed rate term loans, which have been hedged to floating rates (using interest rate swaps), are measured at amortised cost adjusted for changes in value attributable to the hedged risks arising from changes in underlying market interest rates. The computation of amortised cost includes any issue costs and any discount or premium materialising on settlement.

Gains and losses are recognised in the Consolidated Income Statement through amortisation on the basis of the period of the loans and borrowings.

Borrowing costs arising on financial instruments are recognised as an expense in the period in which they are incurred (unless capitalised as part of the cost of property, plant and equipment).

### Derivative financial instruments and hedging practices – Note 25

In order to manage interest rate, foreign currency and commodity risks and to realise the desired currency profile of borrowings, the Group employs derivative financial instruments (principally interest rate swaps, currency swaps and forward foreign exchange contracts). Derivative financial instruments are recognised initially at fair value on the date on which a derivative contract is entered into and are subsequently remeasured at fair value. The carrying value of derivatives is fair value based on discounted future cash flows and adjusted for counterparty risk. Future floating rate cash flows are estimated based on future interest rates (from observable yield curves at the end of the reporting period). Fixed and floating rate cash flows are discounted at future interest rates and translated at period-end foreign exchange rates.

At the inception of a derivative transaction, the Group documents the relationship between the hedged item and the hedging instrument together with its risk management objective and the strategy underlying the proposed transaction. The Group also documents its assessment, both at the inception of the hedging relationship and subsequently on an ongoing basis, of the effectiveness of the hedging instrument in offsetting movements in the fair values or cash flows of the hedged items. Where derivatives do not fulfil the criteria for hedge accounting, changes in fair values are reported in the Consolidated Income Statement.

### Fair value and cash flow hedges

The Group uses fair value hedges and cash flow hedges in its treasury activities. For the purposes of hedge accounting, hedges are classified either as fair value hedges (which entail hedging the exposure to movements in the fair value of a recognised asset or liability or an unrecognised firm commitment that could affect profit or loss) or cash flow hedges (which hedge exposure to fluctuations in future cash flows derived from a particular risk associated with a recognised asset or liability, or a highly probable forecast transaction that could affect profit or loss).

Where the conditions for hedge accounting are satisfied and the hedging instrument concerned is classified as a fair value hedge, any gain or loss stemming from the remeasurement of the hedging instrument to fair value is reported in the Consolidated Income Statement.

In addition, any gain or loss on the hedged item which is attributable to the hedged risk is adjusted against the carrying amount of the hedged item and reflected in the Consolidated Income Statement. Where the adjustment is to the carrying amount of a hedged interest-bearing financial instrument, the adjustment is amortised to the Consolidated Income Statement with the objective of achieving full amortisation by maturity.

Where a derivative financial instrument is designated as a hedge of the variability in cash flows of a recognised asset or liability or a highly probable forecast transaction that could affect profit or loss, the effective part of any gain or loss on the derivative financial instrument is recognised as other comprehensive income, net of the income tax effect, with the ineffective

portion being reported in the Consolidated Income Statement. The associated gains or losses that had previously been recognised as other comprehensive income are transferred to the Consolidated Income Statement contemporaneously with the materialisation of the hedged transaction. Any gain or loss arising in respect of changes in the time value of the derivative financial instrument is excluded from the measurement of hedge effectiveness and is recognised immediately in the Consolidated Income Statement.

Hedge accounting is discontinued when the hedging instrument expires or is sold, terminated or exercised, or no longer qualifies for hedge accounting. At that point in time, any cumulative gain or loss on the hedging instrument recognised as other comprehensive income remains there until the forecast transaction occurs. If a hedged transaction is no longer anticipated to occur, the net cumulative gain or loss previously recognised as other comprehensive income is transferred to the Consolidated Income Statement in the period.

### Net investment hedges

Where foreign currency borrowings provide a hedge against a net investment in a foreign operation, and the hedge is deemed to be effective, foreign exchange differences are taken directly to a foreign currency translation reserve. The ineffective portion of any gain or loss on the hedging instrument is recognised immediately in the Consolidated Income Statement. Cumulative gains and losses remain in equity until disposal of the net investment in the foreign operation at which point the related differences are transferred to the Consolidated Income Statement as part of the overall gain or loss on sale.

### Share capital and dividends – Notes 12 and 30

#### Treasury Shares and own shares

Ordinary Shares acquired by the Parent Company or purchased by the Employee Benefit Trust on behalf of the Parent Company under the terms of the Performance Share Plans and the Restricted Share Plan are deducted from equity and presented on the face of the Consolidated Balance Sheet. No gain or loss is

recognised in profit or loss on the purchase, sale, issue or cancellation of the Parent Company's Ordinary Shares.

### Dividends

Dividends on Ordinary Shares are recognised as a liability in the Consolidated Financial Statements in the period in which they are declared by the Parent Company.

### Foreign currency translation

Items included in the financial statements of each of the Group's entities are measured using the currency of the primary economic environment in which the entity operates ("the functional currency"). The Consolidated Financial Statements are presented in euro, which is the presentation currency of the Group and the functional currency of the Parent Company.

Transactions in foreign currencies are recorded at the rate ruling at the date of the transaction. Monetary assets and liabilities denominated in foreign currencies are retranslated at the rate of exchange ruling at the balance sheet date. All currency translation differences are taken to the Consolidated Income Statement with the exception of all monetary items that provide an effective hedge for a net investment in a foreign operation. These are recognised in other comprehensive income until the disposal of the net investment, at which time they are recognised in the Consolidated Income Statement.

Results and cash flows of subsidiaries, joint ventures and associates with non-euro functional currencies have been translated into euro at average exchange rates for the year, and the related balance sheets have been translated at the rates of exchange ruling at the balance sheet date. Adjustments arising on translation of the results and net assets of non-euro subsidiaries, joint ventures and associates are recognised in a separate translation reserve within equity, net of differences on related currency borrowings. All other translation differences are taken to the Consolidated Income Statement. Goodwill and fair value adjustments arising on acquisition of a foreign operation are regarded as assets and liabilities of the foreign operation and are translated accordingly.



## Accounting Policies - continued

The principal exchange rates used for the translation of results, cash flows and balance sheets into euro were as follows:

euro 1 =	Average			Year-end	
	2017	2016	2015	2017	2016
Brazilian Real	3.6054	3.8561	3.7004	3.9729	3.4305
Canadian Dollar	1.4647	1.4659	1.4186	1.5039	1.4188
Chinese Renminbi	7.6290	7.3522	6.9733	7.8044	7.3202
Hungarian Forint	309.1933	311.4379	309.9956	310.3300	309.8300
Indian Rupee	73.5324	74.3717	71.1956	76.6055	71.5935
Philippine Peso	56.9734	52.5555	50.5217	59.7950	52.2680
Polish Zloty	4.2570	4.3632	4.1841	4.1770	4.4103
Pound Sterling	0.8767	0.8195	0.7258	0.8872	0.8562
Romanian Leu	4.5688	4.4904	4.4454	4.6585	4.5390
Serbian Dinar	121.3232	123.1356	120.7168	118.3086	123.4600
Swiss Franc	1.1117	1.0902	1.0679	1.1702	1.0739
Ukrainian Hryvnia	30.0341	28.2812	24.3693	33.6769	28.6043
US Dollar	1.1297	1.1069	1.1095	1.1993	1.0541

## Notes on Consolidated Financial Statements

### 1. Segment Information

CRH is a leading global diversified building materials group which manufactures and distributes a range of building materials products from the fundamentals of heavy materials and elements to construct the frame, through value-added products that complete the building envelope, to distribution channels which service construction fit-out and renewal.

During 2017, our dedicated European landscaping businesses, previously included within our Europe Heavyside segment, were reorganised to form a new platform, Architectural Products, within our Europe Lightside segment. Comparative segment amounts for 2016 and 2015 have been restated where necessary to reflect the new format for segmentation.

The Group reports across the following six operating segments: Europe Heavyside, Europe Lightside, Europe Distribution, Americas Materials, Americas Products and Asia reflecting the Group's organisational structure and the nature of the financial information reported to and assessed by the Group Chief Executive and Finance Director, who are together determined to fulfil the role of Chief Operating Decision Maker (as defined in IFRS 8 *Operating Segments*).

The principal factors employed in the identification of the six segments reflected in this note include:

- the Group's organisational structure in 2017 (during 2017 each divisional President fulfilled the role of "segment manager" as outlined in IFRS 8, with the President of Europe Lightside and Distribution acting as "segment manager" for each of the Europe Lightside and Europe Distribution segments respectively);
- the nature of the reporting lines to the Chief Operating Decision Maker (as defined in IFRS 8);
- the structure of internal reporting documentation such as management accounts and budgets; and
- the degree of homogeneity of products, services and geographical areas within each of the segments from which revenue is derived

The Chief Operating Decision Maker monitors the operating results of segments separately in order to allocate resources between segments and to assess performance. Segment performance is predominantly evaluated based on operating profit. As performance is also evaluated using operating profit before depreciation, amortisation and impairment (EBITDA (as defined)\*), supplemental information based on EBITDA (as defined)\* is provided overleaf. Given that net finance costs and income tax are managed on a centralised basis, these items are not allocated between operating segments for the purposes of the information presented to the Chief Operating Decision Maker and are accordingly omitted from the detailed segmental analysis below. There are no asymmetrical allocations to reporting segments which would require disclosure.

*Europe Heavyside* businesses are predominantly engaged in the manufacture and supply of cement, lime, aggregates, readymixed and precast concrete and asphalt products. The segment comprises businesses operating in 19 countries across Western, Central and Eastern Europe.

*Europe Lightside* businesses are predominantly engaged in the production and supply of construction accessories, architectural products, shutters & awnings, perimeter protection & network access products across 17 countries primarily in Western Europe.

*Europe Distribution* businesses are predominantly engaged in supplying General Merchants, Sanitary, Heating and Plumbing (SHAP) and Do-It-Yourself (DIY) businesses catering to the general public and small and medium-sized builders in the Netherlands, Belgium, France, Germany, Switzerland and Austria, selling a range of bricks, cement, sanitary, heating, plumbing and other building products.

*Americas Materials* businesses are predominantly engaged in the production and sale of aggregates, asphalt, cement and readymixed concrete products and provide asphalt paving services in the US and Canada. This segment also includes the Group's cement operations in Brazil.

*Americas Products* businesses are predominantly engaged in the production and sale in the US and Canada of concrete masonry and hardscapes, packaged lawn and garden products, packaged cement mixes, fencing, utility, drainage and structural precast products, construction accessories and glass and aluminium glazing systems.

*Asia* businesses are predominantly engaged in the manufacture and supply of cement and aggregates in the Philippines.

The *Americas Distribution* business has been classified as discontinued operations in the current year; its performance in this year and comparative years is therefore part of discontinued operations. See note 2 for further details.





## 1. Segment Information - continued

### C. Operating segments disclosures - other items

#### Additions to non-current assets

	Year ended 31 December									
	Property, plant and equipment (note 14)			Financial assets (note 16)			Total Group			
	2017	2016	2015	2017	2016	2015	2017	2016	2015	
€m	€m	€m	€m	€m	€m	€m	€m	€m	€m	
<i>Continuing operations</i>										
Europe Heavyside	349	260	238	-	2	8	349	262	246	
Europe Lightside	36	27	38	-	-	-	36	27	38	
Europe Distribution	33	26	46	-	-	1	33	26	47	
Europe	418	313	322	-	2	9	418	315	331	
Americas Materials	375	328	335	5	5	10	380	333	345	
Americas Products	167	142	153	6	-	-	173	142	153	
Americas	542	470	488	11	5	10	553	475	498	
Asia	55	47	31	-	-	-	55	47	31	
Total Group from continuing operations	1,015	830	841	11	7	19	1,026	837	860	
<i>Discontinued operations</i>										
Americas Distribution	29	23	41	-	-	-	29	23	41	
Total Group	1,044	853	882	11	7	19	1,055	860	901	

### D. Entity-wide disclosures

#### Section 1: Information about products and services

The Group's revenue from external customers in respect of its principal products and services is analysed in the disclosures above. Segment revenue includes €5,236 million (2016: €5,102 million; 2015: €4,523 million) in respect of revenue applicable to construction contracts. The bulk of our construction activities are performed by our Americas Materials reportable segment, are for the most part short-term in nature and are generally completed within the same financial reporting period.

Revenue derived through the supply of services and intersegment revenue are not material to the Group. The transfer pricing policy implemented by the Group between operating segments and across its constituent entities is described in greater detail in note 33. In addition, due to the nature of building materials, which have a low value-to-weight ratio, the Group's revenue streams include a low level of cross-border transactions.

#### Section 2: Information about geographical areas and customers

CRH has a presence in 32 countries worldwide. The revenues from external customers and non-current assets (as defined in IFRS 8) attributable to the country of domicile and all foreign countries of operation are set out below; individual foreign countries which exceed 10% of total external Group revenue have been highlighted separately on the basis of materiality.

	Year ended 31 December						As at 31 December	
	Revenue by destination			Non-current assets*			2017	2016
	2017	2016	2015	2017	2016	2017	2016	
€m	€m	€m	€m	€m	€m	€m	€m	
Country of domicile - Republic of Ireland	435	403	349	493	475			
Benelux (mainly the Netherlands)	2,589	2,576	2,478	1,162	1,201			
United Kingdom	3,023	3,091	1,694	2,395	2,487			
United States	10,844	10,415	9,819	8,749	8,710			
Other	8,329	8,304	7,066	8,757	8,346			
Total Group from continuing operations	25,220	24,789	21,406	21,556	21,219			
United States - Americas Distribution	2,343	2,315	2,229	476	531			
Total Group	27,563	27,104	23,635	22,032	21,750			

There are no material dependencies or concentrations of individual customers which would warrant disclosure under IFRS 8. The individual entities within the Group have a large number of customers spread across various activities, end-uses and geographies.

## 2. Assets Held for Sale and Discontinued Operations

In August 2017, the Group entered into a sales agreement with Beacon Roofing Supply Inc. to dispose of its 100% holding in Allied Building Products, the trading name of our Americas Distribution segment, for a consideration of US\$2.6 billion. The transaction closed on 2 January 2018. The assets associated with this transaction met the 'held for sale' criteria set out in IFRS 5 and the relevant assets and liabilities have accordingly been reclassified as assets and liabilities held for sale as appropriate as set out in the table below. The proceeds of the sale exceeded the carrying amount of the related net assets and, accordingly, no impairment loss was recognised on the reclassification of Americas Distribution as held for sale.

The businesses divested in 2017 are not considered to be either separate major lines of business or geographical areas of operation and therefore do not constitute discontinued operations as defined by IFRS 5.

### A. Discontinued operations

The results of the discontinued operations included in the Group profit for the financial year are set out below:

	2017	2016	2015
	€m	€m	€m
Revenue	2,343	2,315	2,229
EBITDA (as defined)*	164	150	140
Depreciation	(16)	(22)	(18)
Amortisation	(5)	(9)	(11)
Operating profit	143	119	111
Profit on disposals	3	2	2
Profit before tax	146	121	113
Attributable income tax expense (i)	(39)	(40)	(28)
Profit after tax	107	81	85
Basic earnings per Ordinary Share from discontinued operations	12.8c	9.8c	10.4c
Diluted earnings per Ordinary Share from discontinued operations	12.7c	9.7c	10.4c
Cash flows from discontinued operations			
Net cash inflow from operating activities	111	123	173
Net cash outflow from investing activities	(27)	(22)	(39)
Net cash inflow/(outflow) from financing activities	1	(1)	-
Net cash inflows	85	100	134

(i) The 2017 attributable income tax expense includes a non-cash deferred tax credit of €7 million related to the enactment of the "Tax Cuts and Jobs Act" in the US during the year.

### B. Assets held for sale

	2017
	€m
Assets	
Property, plant and equipment (note 14)	104
Intangible assets (note 15)	372
Deferred income tax assets (note 27)	16
Inventories (note 20)	266
Trade and other receivables (note 20)	334
Cash and cash equivalents (note 23)	20
Assets held for sale	1,112
Liabilities	
Trade and other payables (note 20)	306
Interest-bearing loans and borrowings (note 24)	5
Deferred income tax liabilities (note 27)	30
Liabilities associated with assets classified as held for sale	341
Net assets held for sale	771

Total gains recognised in other comprehensive income and accumulated in equity relating to assets held for sale amounted to €32 million at 31 December 2017.



### 3. Cost Analysis

Continuing Operations

	2017 €m	2016 €m	2015 €m
<b>Cost of sales analysis</b>			
Raw materials and goods for resale	7,428	7,307	6,978
Employment costs (note 6)	2,869	2,725	2,446
Energy conversion costs	1,004	940	789
Repairs and maintenance	811	803	630
Depreciation, amortisation and impairment (i)	830	817	697
Change in inventory	(142)	(33)	37
Other production expenses (primarily sub-contractor costs and equipment rental)	4,103	4,007	3,166
<b>Total</b>	<b>16,903</b>	<b>16,566</b>	<b>14,743</b>
<b>Operating costs analysis</b>			
Selling and distribution costs	4,236	4,100	3,593
Administrative expenses	1,986	2,215	1,904
<b>Total</b>	<b>6,222</b>	<b>6,315</b>	<b>5,497</b>

(i) Depreciation, amortisation and impairment analysis

	Cost of sales			Operating costs			Total		
	2017 €m	2016 €m	2015 €m	2017 €m	2016 €m	2015 €m	2017 €m	2016 €m	2015 €m
Depreciation and depletion (note 14)	830	817	667	160	170	158	990	987	825
Amortisation of intangible assets (note 15)	-	-	-	61	62	44	61	62	44
Impairment of property, plant and equipment	-	-	30	-	-	11	-	-	41
Impairment of intangible assets (note 15)	-	-	-	-	23	1	-	23	1
Impairment of financial assets	-	-	-	-	-	2	-	-	2
<b>Total</b>	<b>830</b>	<b>817</b>	<b>697</b>	<b>221</b>	<b>255</b>	<b>216</b>	<b>1,051</b>	<b>1,072</b>	<b>913</b>

### 4. Operating Profit Disclosures

Continuing Operations

	2017 €m	2016 €m	2015 €m
<b>Operating lease rentals</b>			
- hire of plant and machinery	292	262	200
- land and buildings	258	250	221
- other operating leases	56	57	50
<b>Total</b>	<b>606</b>	<b>569</b>	<b>471</b>

**Auditor's remuneration**

In accordance with statutory requirements in Ireland, fees for professional services provided by the Group's independent auditor in respect of each of the following categories were:

	EY Ireland (statutory auditor)			EY (network firms)			Total		
	2017 €m	2016 €m	2015 €m	2017 €m	2016 €m	2015 €m	2017 €m	2016 €m	2015 €m
Audit fees (i)	4	3	3	16	16	16	20	19	19
Other audit-related assurance fees (ii)	-	-	1	1	-	4	1	-	5
Tax advisory services	-	-	-	1	1	2	1	1	2
<b>Total</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>18</b>	<b>17</b>	<b>22</b>	<b>22</b>	<b>20</b>	<b>26</b>

(i) Audit of the Group accounts includes audit of internal controls over financial reporting and parent and subsidiary statutory audit fees, but excludes €2 million (2016: €2 million; 2015: €2 million) paid to auditors other than EY.

(ii) Other assurance services includes attestation and due diligence services that are closely related to the performance of the audit.

(iii) There were no other fees for services provided by the Group's independent auditor (2016: €nil million; 2015: €nil million).



## 5. Business and Non-Current Asset Disposals

### Continuing Operations

	Business disposals			Disposal of other non-current assets			Total		
	2017	2016	2015 (i)	2017	2016	2015	2017	2016	2015
	€m	€m	€m	€m	€m	€m	€m	€m	€m
<b>Assets/(liabilities) disposed of at net carrying amount:</b>									
- non-current assets (notes 14,15,16)	47	147	570	79	109	103	126	256	673
- cash and cash equivalents	11	3	90	-	-	-	11	3	90
- working capital and provisions (note 20)	29	24	246	-	-	-	29	24	246
- interest-bearing loans and borrowings	-	-	(20)	-	-	-	-	-	(20)
- deferred tax (note 27)	2	(1)	(22)	-	-	-	2	(1)	(22)
- retirement benefit obligations	-	-	(84)	-	-	-	-	-	(84)
<b>Net assets disposed</b>	<b>89</b>	<b>173</b>	<b>780</b>	<b>79</b>	<b>109</b>	<b>103</b>	<b>168</b>	<b>282</b>	<b>883</b>
Reclassification of currency translation effects on disposal	9	(44)	39	-	-	-	9	(44)	39
<b>Total</b>	<b>98</b>	<b>129</b>	<b>819</b>	<b>79</b>	<b>109</b>	<b>103</b>	<b>177</b>	<b>238</b>	<b>922</b>
Proceeds from disposals (net of disposal costs)	99	133	875	134	158	140	233	291	1,015
Profit on step acquisition (note 31)	-	-	6	-	-	-	-	-	6
<b>Profit on disposals</b>	<b>1</b>	<b>4</b>	<b>62</b>	<b>55</b>	<b>49</b>	<b>37</b>	<b>56</b>	<b>53</b>	<b>99</b>
<b>Net cash inflow arising on disposal</b>									
Proceeds from disposals from continuing operations	99	133	875	134	158	140	233	291	1,015
Proceeds from disposals from discontinued operations	-	-	-	3	2	2	3	2	2
Less: cash and cash equivalents disposed	(11)	(3)	(90)	-	-	-	(11)	(3)	(90)
Less: deferred proceeds arising on disposal (note 20)	(3)	(7)	(38)	-	-	-	(3)	(7)	(38)
<b>Total</b>	<b>85</b>	<b>123</b>	<b>747</b>	<b>137</b>	<b>160</b>	<b>142</b>	<b>222</b>	<b>283</b>	<b>889</b>

(i) Disposals in 2015 related principally to the divestment of the Group's clay and certain concrete businesses in the UK (Europe Heavyside) and its clay business in the US (Americas Products) on 26 February 2015.

## 6. Employment

### Continuing Operations

The average number of employees is as follows:

	Year ended 31 December		
	2017	2016	2015
Europe Heavyside	24,401	24,551	18,131
Europe Lightside	7,272	7,084	7,360
Europe Distribution	11,036	10,971	11,392
<b>Europe</b>	<b>42,709</b>	<b>42,606</b>	<b>36,883</b>
Americas Materials	24,077	22,650	20,125
Americas Products	17,146	16,259	16,712
<b>Americas</b>	<b>41,223</b>	<b>38,909</b>	<b>36,837</b>
Asia	1,431	1,374	466
<b>Total Group</b>	<b>85,363</b>	<b>82,889</b>	<b>74,186</b>

Employment costs charged in the Consolidated Income Statement are analysed as follows:

	2017	2016	2015
	€m	€m	€m
Wages and salaries	3,997	3,915	3,474
Social welfare costs	465	454	401
Other employment-related costs*	546	531	505
Share-based payment expense (note 8)	60	44	26
Total retirement benefits expense (note 28)	236	307	281
<b>Total</b>	<b>5,304</b>	<b>5,251</b>	<b>4,687</b>
<b>Total charge analysed between:</b>			
Cost of sales	2,869	2,725	2,446
Operating costs	2,424	2,514	2,224
Finance costs (net) - applicable to retirement benefit obligations (note 9)	11	12	17
<b>Total</b>	<b>5,304</b>	<b>5,251</b>	<b>4,687</b>

\* Other employment costs relate principally to redundancy, severance and healthcare costs.

Employment costs including discontinued operations were €5,588 million (2016: €5,532 million; 2015: €4,961 million). The average number of employees including discontinued operations were 89,213 (2016: 86,778; 2015: 78,106).

## 7. Directors' Emoluments and Interests

Directors' emoluments (which are included in administrative expenses in note 3) and interests are presented in the Directors' Remuneration Report on pages 72 to 95.



## 8. Share-based Payment Expense

### Continuing Operations

	2017 €m	2016 €m	2015 €m
Performance Share Plans and Restricted Share Plan expense	57	38	25
Share option expense	3	6	1
<b>Total share-based payment expense</b>	<b>60</b>	<b>44</b>	<b>26</b>

Share-based payment expense relates primarily to awards granted under the 2014 Performance Share Plan and the Group's share option schemes. The expense, which also includes charges in relation to the 2013 Restricted Share Plan, is reflected in operating costs in the Consolidated Income Statement.

#### 2014 Performance Share Plan

The structure of the 2014 Performance Share Plan is set out in the Directors' Remuneration Report on page 84. An expense of €56 million was recognised in 2017 (2016: €37 million; 2015: €19 million).

##### Details of awards granted under the 2014 Performance Share Plan

	Share price at date of award	Period to earliest release date	Number of shares	
			Initial award*	Net outstanding at 31 December 2017
Granted in 2017	€33.21	3 years	3,342,900	3,156,995
Granted in 2016	€24.87	3 years	3,879,901	3,437,098
Granted in 2015	€24.84	3 years	2,989,371	2,644,593

\* Numbers represent the initial awards including those granted to employees of Allied Building Products. The Remuneration Committee has determined that dividend equivalents will accrue on awards under the 2014 Performance Share Plan. Subject to satisfaction of the applicable performance criteria, such dividend equivalents will be released to participants in the form of additional shares on vesting.

50% of each award made in 2017 and 2016 is subject to a TSR measure, with 25% being measured against a tailored sector peer group and 25% against the FTSE All-World Construction & Materials index. The other 50% of each award made in 2017 and 2016 is subject to a cumulative cash flow metric. The awards made in 2015 are subject to TSR (75% of each award) and cumulative cash flow (25% of each award) metrics. Further details are set out on page 84 in the Directors' Remuneration Report.

The fair values assigned to the portion of awards which are subject to TSR performance against peers and the index were €17.43 and €14.99 respectively (2016: €11.94 and €10.52 respectively; 2015: €13.99 subject to TSR performance against peers only). The fair value of these awards was calculated using a TSR pricing model taking account of peer group TSR, volatilities and correlations together with the following assumptions:

	2017	2016	2015
Risk-free interest rate (%)	(0.40)	(0.53)	0.25
Expected volatility (%)	30.1	21.7	21.4

The expected volatility was determined using a historical sample of daily CRH share prices.

The fair value of (i) the portion of awards subject to cash flow performance and (ii) the awards with no performance conditions (which are subject to a one or three-year service period) was €33.21 (2016: €24.87; 2015: €24.84). The fair value was calculated using the closing CRH share price at the date the award was granted.

#### Share Option Schemes

The 2010 Share Option Scheme was replaced in 2014 by the 2014 Performance Share Plan, and accordingly no options have been granted since 2013.

##### Details of movement and options outstanding under Share Option Schemes (excluding Savings-related Share Option Schemes)

	Weighted average exercise price	Number of options 2017	Weighted average exercise price	Number of options 2016	Weighted average exercise price	Number of options 2015
Outstanding at beginning of year	€21.51	2,997,495	€21.14	8,620,690	€19.58	15,481,191
Exercised (i)	€24.85	(1,462,863)	€22.04	(2,102,332)	€19.35	(2,544,141)
Lapsed	€24.14	(92,853)	€20.27	(3,520,863)	€16.64	(4,316,360)
Outstanding at end of year (ii)	€17.96	1,441,779	€21.51	2,997,495	€21.14	8,620,690
Exercisable at end of year	€17.96	1,441,779	€21.51	2,997,495	€24.18	5,335,290

(i) The weighted average share price at the date of exercise of these options was €32.24 (2016: €29.70; 2015: €25.51).

(ii) All options granted have a life of ten years.

	2017	2016	2015
Weighted average remaining contractual life for the share options outstanding at 31 December (years)	2.53	2.46	3.86
euro-denominated options outstanding at end of year (number)	1,436,115	2,991,831	8,604,776
Range of exercise prices (€)	16.19-21.52	16.19-29.86	16.19-29.86
Pound Sterling-denominated options outstanding at end of year (number)	5,664	5,664	15,914
Range of exercise prices (Stg£)	15.30-17.19	15.30-17.19	13.64-18.02

#### 2010 Savings-related Share Option Schemes

The Group operates Savings-related Share Option Schemes. Participants may save up to €500/Stg£500 per month from their net salaries for a fixed term of three or five years and at the end of the savings period they have the option to buy CRH shares at a discount of up to 15% of the market price on the date of invitation of each savings contract.

##### Details of options granted under the Savings-related Share Option Schemes

	Weighted average exercise price	Number of options 2017	Weighted average exercise price	Number of options 2016	Weighted average exercise price	Number of options 2015
Outstanding at beginning of year	€18.63/Stg£15.92	1,402,174	€16.96/Stg£14.27	593,177	€14.84/Stg£12.80	894,548
Exercised (i)	€15.73/Stg£14.27	(126,472)	€13.66/Stg£11.95	(121,242)	€13.42/Stg£12.07	(331,925)
Lapsed	€21.42/Stg£18.22	(123,455)	€17.55/Stg£15.68	(81,628)	€13.52/Stg£13.63	(187,892)
Granted (ii)	€27.86/Stg£24.51	404,052	€20.83/Stg£16.16	1,011,867	€21.12/Stg£15.54	218,446
Outstanding at end of year	€21.50/Stg£18.05	1,556,299	€18.63/Stg£15.92	1,402,174	€16.96/Stg£14.27	593,177
Exercisable at end of year	€15.89/n/a	15,890	€13.45/Stg£12.22	23,897	€13.72/n/a	15,165

(i) The weighted average share price at the date of exercise of these options was €31.14 (2016: €27.90; 2015: €25.77).

(ii) Pursuant to the 2010 Savings-related Share Option Schemes operated by the Group, employees were granted options over 404,052 of CRH plc's Ordinary Shares in March 2017 (2016: 1,011,867 share options in March 2016; 2015: 218,446 share options in March 2015). This figure comprises options over 304,492 (2016: 692,334; 2015: 152,312) shares and 99,560 (2016: 319,533; 2015: 66,134) shares which are normally exercisable within a period of six months after the third or the fifth anniversary of the contract, whichever is applicable, and are not subject to specified EPS growth targets being achieved. The exercise price at which the options are granted under the scheme represents a discount of 15% to the market price on the date of invitation of each savings contract.



## 8. Share-based Payment Expense - continued

### Continuing Operations

	2017	2016	2015
Weighted average remaining contractual life for the share options outstanding at 31 December (years)	1.90	2.41	1.96
euro-denominated options outstanding at end of year (number)	304,963	320,362	321,059
Range of exercise prices (€)	13.64-27.86	12.82-21.12	12.82-21.12
Pound Sterling-denominated options outstanding at end of year (number)	1,251,336	1,081,812	272,118
Range of exercise prices (Stg£)	12.22-24.51	11.55-16.16	11.19-15.54

The weighted fair values assigned to options issued under the Savings-related Share Option Schemes, which were computed in accordance with the trinomial valuation methodology, were as follows:

	3-year	5-year
Granted in 2017	€5.97	€6.49
Granted in 2016	€5.01	€5.57
Granted in 2015	€4.59	€6.08

The fair value of these options were determined using the following assumptions:

	2017		2016		2015	
	3-year	5-year	3-year	5-year	3-year	5-year
Weighted average exercise price (€)	27.86	27.86	20.83	20.83	21.12	21.12
Risk-free interest rate (%)	(0.72)	(0.45)	(0.48)	(0.33)	(0.22)	(0.09)
Expected dividend payments over the expected life (€)	2.07	3.55	1.95	3.32	1.91	3.25
Expected volatility (%)	20.9	20.6	21.8	22.9	21.6	27.8
Expected life in years	3	5	3	5	3	5

The expected volatility was determined using a historical sample of 37 month-end CRH share prices in respect of the three-year savings-related share options and 61 month-end share prices in respect of the five-year savings-related share options. The expected lives of the options are based on historical data and are therefore not necessarily indicative of exercise patterns that may materialise.

Other than the assumptions listed above, no other features of options grants were factored into the determination of fair value.

The terms of the options issued under the savings-related share option schemes do not contain any market conditions within the meaning of IFRS 2 *Share-based Payment*.

## 9. Finance Costs and Finance Income

### Continuing Operations

	2017 €m	2016 €m	2015 €m
<b>Finance costs</b>			
Interest payable on borrowings	300	337	334
Net loss/(income) on interest rate and currency swaps	2	(10)	(32)
<i>Mark-to-market of derivatives and related fixed rate debt:</i>			
- interest rate swaps (i)	16	14	12
- currency swaps and forward contracts	-	(3)	4
- fixed rate debt (i)	(23)	(20)	(22)
Net loss on interest rate swaps not designated as hedges	6	7	7
<b>Net finance cost on gross debt including related derivatives</b>	<b>301</b>	<b>325</b>	<b>303</b>
<b>Finance income</b>			
Interest receivable on loans to joint ventures and associates	(5)	(4)	(4)
Interest receivable on cash and cash equivalents and other	(7)	(4)	(4)
<b>Finance income</b>	<b>(12)</b>	<b>(8)</b>	<b>(8)</b>
<b>Finance costs less income</b>	<b>289</b>	<b>317</b>	<b>295</b>
<b>Other financial expense</b>			
Premium paid on early debt redemption	18	-	38
Unwinding of discount element of provisions for liabilities (note 26)	24	30	19
Unwinding of discount applicable to deferred and contingent acquisition consideration (note 19)	7	24	20
Pension-related finance cost (net) (note 28)	11	12	17
<b>Total</b>	<b>60</b>	<b>66</b>	<b>94</b>
<b>Total net finance costs</b>	<b>349</b>	<b>383</b>	<b>389</b>

- (i) The Group uses interest rate swaps to convert fixed rate debt to floating rate. Fixed rate debt, which has been converted to floating rate through the use of interest rate swaps, is stated in the Consolidated Balance Sheet at adjusted value to reflect movements in underlying fixed rates. The movement on this adjustment, together with the offsetting movement in the fair value of the related interest rate swaps, is included in finance costs in each reporting period.





## 10. Share of Equity Accounted Investments' Profit

The Group's share of joint ventures' and associates' profit after tax is equity accounted and is presented as a single line item in the Consolidated Income Statement; it is analysed as follows between the principal Consolidated Income Statement captions:

	Joint Ventures			Associates			Total		
	2017	2016	2015	2017	2016	2015	2017	2016	2015
	€m	€m	€m	€m	€m	€m	€m	€m	€m
<i>Group share of:</i>									
Revenue	582	480	496	816	769	961	1,398	1,249	1,457
EBITDA (as defined)*	77	85	79	77	52	84	154	137	163
Depreciation and amortisation	(28)	(26)	(27)	(39)	(40)	(55)	(67)	(66)	(82)
Operating profit	49	59	52	38	12	29	87	71	81
Finance costs (net)	(1)	(4)	(6)	(10)	(15)	(17)	(11)	(19)	(23)
Profit/(loss) before tax	48	55	46	28	(3)	12	76	52	58
Income tax expense	(5)	(4)	(5)	(6)	(6)	(9)	(11)	(10)	(14)
Profit/(loss) after tax	43	51	41	22	(9)	3	65	42	44

An analysis of the profit after tax by operating segment is presented in note 1. The aggregated balance sheet data (analysed between current and non-current assets and liabilities) in respect of the Group's investment in joint ventures and associates is presented in note 16.

\* EBITDA is defined as earnings before interest, taxes, depreciation, amortisation, asset impairment charges and profit on disposals.

## 11. Income Tax Expense

### Continuing Operations

#### Recognised within the Consolidated Income Statement

	2017	2016	2015
	€m	€m	€m
<i>(a) Current tax</i>			
Republic of Ireland	9	5	-
Overseas	312	443	320
Total current tax expense	321	448	320
<i>(b) Deferred tax</i>			
<i>Origination and reversal of temporary differences:</i>			
Retirement benefit obligations	16	8	7
Share-based payment expense	(4)	(11)	(8)
Derivative financial instruments	2	1	1
Other items (including deferred tax credit associated with the "Tax Cuts and Jobs Act" and other timing differences)	(280)	(15)	(44)
Total deferred tax income	(266)	(17)	(44)
Income tax reported in the Consolidated Income Statement	55	431	276

#### Recognised outside the Consolidated Income Statement

(a) Within the Consolidated Statement of Comprehensive Income:

Deferred tax - retirement benefit obligations

	2017	2016	2015
	€m	€m	€m
Deferred tax - retirement benefit obligations	(33)	3	(30)

(b) Within the Consolidated Statement of Changes in Equity:

#### Current tax

Current tax - share option exercises

	2017	2016	2015
	€m	€m	€m
Current tax - share option exercises	2	-	-

#### Deferred tax

Deferred tax - share-based payment expense

	2017	2016	2015
	€m	€m	€m
Deferred tax - share-based payment expense	(7)	12	5

(5) 12 5

#### Income tax recognised outside the Consolidated Income Statement

(38) 15 (25)

#### Reconciliation of applicable tax rate to effective tax rate

	2017	2016	2015
	%	%	%
Profit before tax (€m)	1,867	1,620	920
Tax charge expressed as a percentage of profit before tax (effective tax rate):			
- current tax expense only	17.2%	27.7%	34.8%
- total income tax expense (current and deferred)	2.9%	26.6%	30.0%

The following table reconciles the applicable Republic of Ireland statutory tax rate to the effective tax rate (current and deferred) of the Group:

	% of profit before tax		
	2017	2016	2015
Irish corporation tax rate	12.5	12.5	12.5
Higher tax rates on overseas earnings	15.9	15.1	12.3
Deferred tax credit relating to the enactment of the "Tax Cuts and Jobs Act"	(23.6)	-	-
Other items (primarily comprising items not chargeable to tax/expenses not deductible for tax)	(1.9)	(1.0)	5.2
Total effective tax rate	2.9	26.6	30.0

#### Other disclosures

##### Effective tax rate

The 2017 effective tax rate is 2.9%. The 2017 reported tax charge includes a non-cash deferred tax credit of €440 million related to the enactment of the "Tax Cuts and Jobs Act" in the US during the year. The 2017 effective tax rate excluding the impact of this exceptional deferred tax credit is 26.5%.

The tax charge associated with discontinued operations during 2017 is recognised separately in "Profit after tax for the financial year from discontinued operations". See note 2 for further details.

The 2015 Consolidated Income Statement included one-off charges related to the LH Assets transaction of €197 million which were substantially non-deductible for income tax purposes. The 2015 effective tax rate excluding the impact of these costs was 25.8%.

##### Changes in tax rates

The total tax charge in future periods will be affected by any changes to the tax rates in force in the countries in which the Group operates.

##### Excess of capital allowances over depreciation

The current tax charge will also be impacted by changes in the excess of tax depreciation (capital allowances) over accounting depreciation. Based on current capital investment plans, the Group expects to continue to be in a position to claim capital allowances in excess of depreciation in future years.

##### Investments in subsidiaries

Given management's intention not to unwind temporary differences in respect of its investment in subsidiaries or tax exemptions and credits being available in the majority of jurisdictions in which the Group operates, the aggregate amount of deferred tax liabilities on temporary differences which have not been recognised would be immaterial.

##### Proposed dividends

There are no income tax consequences for the Company in respect of dividends proposed prior to issuance of the Consolidated Financial Statements and for which a liability has not been recognised.



## 12. Dividends

The dividends paid and proposed in respect of each class of share capital are as follows:

	2017 €m	2016 €m	2015 €m
<b>Dividends to shareholders</b>			
<i>Preference</i>			
5% Cumulative Preference Shares €3,175 (2016: €3,175; 2015: €3,175)	-	-	-
7% 'A' Cumulative Preference Shares €77,521 (2016: €77,521; 2015: €77,521)	-	-	-
<i>Equity</i>			
Final - paid 46.20c per Ordinary Share (2016: 44.00c; 2015: 44.00c)	386	363	359
Interim - paid 19.20c per Ordinary Share (2016: 18.80c; 2015: 18.50c)	160	156	152
<b>Total</b>	<b>546</b>	<b>519</b>	<b>511</b>
<b>Reconciliation to Consolidated Statement of Cash Flows</b>			
Dividends to shareholders	546	519	511
Less: issue of scrip shares in lieu of cash dividends (note 30)	(77)	(167)	(132)
<b>Dividends paid to equity holders of the Company</b>	<b>469</b>	<b>352</b>	<b>379</b>
Dividends paid by subsidiaries to non-controlling interests	8	8	4
<b>Total dividends paid</b>	<b>477</b>	<b>360</b>	<b>383</b>
<b>Dividends proposed (memorandum disclosure)</b>			
<i>Equity</i>			
Final 2017 - proposed 48.80c per Ordinary Share (2016: 46.20c; 2015: 44.00c)	409	385	362

## 13. Earnings per Ordinary Share

The computation of basic and diluted earnings per Ordinary Share is set out below:

	2017 €m	2016 €m	2015 €m
<b>Numerator computations</b>			
Group profit for the financial year	1,919	1,270	729
Profit attributable to non-controlling interests	(24)	(27)	(5)
<b>Profit attributable to equity holders of the Company</b>	<b>1,895</b>	<b>1,243</b>	<b>724</b>
<i>Preference dividends</i>			
Profit attributable to ordinary equity holders of the Company - numerator for basic/diluted earnings per Ordinary Share	1,895	1,243	724
Profit after tax for the financial year from discontinued operations	107	81	85
<b>Profit attributable to ordinary equity holders of the Company - numerator for basic/diluted earnings per Ordinary Share from continuing operations</b>	<b>1,788</b>	<b>1,162</b>	<b>639</b>
<b>Denominator computations</b>			
Weighted average number of Ordinary Shares (millions) outstanding for the year (i)	835.6	827.8	812.3
Effect of dilutive potential Ordinary Shares (employee share options) (millions) (i) and (ii)	5.2	6.1	3.6
<b>Denominator for diluted earnings per Ordinary Share</b>	<b>840.8</b>	<b>833.9</b>	<b>815.9</b>
<b>Basic earnings per Ordinary Share</b>	<b>226.8c</b>	<b>150.2c</b>	<b>89.1c</b>
<b>Diluted earnings per Ordinary Share</b>	<b>225.4c</b>	<b>149.1c</b>	<b>88.7c</b>
<b>Basic earnings per Ordinary Share from continuing operations</b>	<b>214.0c</b>	<b>140.4c</b>	<b>78.7c</b>
<b>Diluted earnings per Ordinary Share from continuing operations</b>	<b>212.7c</b>	<b>139.4c</b>	<b>78.3c</b>

(i) The weighted average number of Ordinary Shares included in the computation of basic and diluted earnings per Ordinary Share has been adjusted to exclude shares held by the Employee Benefit Trust and Ordinary Shares repurchased and held by the Company (CRH plc) as Treasury Shares given that these shares do not rank for dividend. The number of Ordinary Shares so held at the balance sheet date is detailed in note 30.

(ii) Contingently issuable Ordinary Shares (totalling 5,710,247 at 31 December 2017, 3,095,404 at 31 December 2016 and 8,630,786 at 31 December 2015) are excluded from the computation of diluted earnings per Ordinary Share where the conditions governing exercisability have not been satisfied as at the end of the reporting period or they are antidilutive for the periods presented.



## 14. Property, Plant and Equipment

	Land and buildings (i) €m	Plant and machinery €m	Assets in course of construction €m	Total €m
<b>At 31 December 2017</b>				
Cost/deemed cost	8,472	13,157	551	22,180
Accumulated depreciation (and impairment charges)	(2,248)	(6,838)	-	(9,086)
<b>Net carrying amount</b>	<b>6,224</b>	<b>6,319</b>	<b>551</b>	<b>13,094</b>
<b>At 1 January 2017, net carrying amount</b>	<b>6,157</b>	<b>6,035</b>	<b>498</b>	<b>12,690</b>
Translation adjustment	(483)	(460)	(33)	(976)
Reclassifications	60	348	(408)	-
Additions at cost	87	481	476	1,044
Arising on acquisition (note 31)	703	812	21	1,536
Reclassified as held for sale	(22)	(79)	(3)	(104)
Disposals at net carrying amount	(53)	(37)	-	(90)
Depreciation charge for year (ii)	(225)	(781)	-	(1,006)
<b>At 31 December 2017, net carrying amount</b>	<b>6,224</b>	<b>6,319</b>	<b>551</b>	<b>13,094</b>

The equivalent disclosure for the prior year is as follows:

<b>At 31 December 2016</b>				
Cost/deemed cost	8,438	13,182	498	22,118
Accumulated depreciation (and impairment charges)	(2,281)	(7,147)	-	(9,428)
<b>Net carrying amount</b>	<b>6,157</b>	<b>6,035</b>	<b>498</b>	<b>12,690</b>
<b>At 1 January 2016, net carrying amount</b>	<b>6,396</b>	<b>6,087</b>	<b>579</b>	<b>13,062</b>
Translation adjustment	9	(62)	(4)	(57)
Reclassifications	41	340	(381)	-
Transfer from trade and other receivables (note 20)	8	-	-	8
Additions at cost	82	451	320	853
Arising on acquisition (note 31)	(17)	51	(15)	19
Disposals at net carrying amount	(129)	(56)	(1)	(186)
Depreciation charge for year (ii)	(233)	(776)	-	(1,009)
<b>At 31 December 2016, net carrying amount</b>	<b>6,157</b>	<b>6,035</b>	<b>498</b>	<b>12,690</b>

<b>At 1 January 2016</b>				
Cost/deemed cost	8,471	12,583	582	21,636
Accumulated depreciation (and impairment charges)	(2,075)	(6,496)	(3)	(8,574)
<b>Net carrying amount</b>	<b>6,396</b>	<b>6,087</b>	<b>579</b>	<b>13,062</b>

(i) The carrying value of mineral-bearing land included in the land and buildings category above amounted to €2,831 million at the balance sheet date (2016: €2,708 million).

(ii) The depreciation charge for the year includes €16 million (2016: €22 million; 2015: €18 million) relating to discontinued operations.

Future purchase commitments for property, plant and equipment	2017 €m	2016 €m
Contracted for but not provided in the financial statements	346	309
Authorised by the Directors but not contracted for	491	467

## 15. Intangible Assets

	Other intangible assets				Total €m
	Goodwill €m	Marketing-related €m	Customer-related (i) €m	Contract-based €m	
<b>At 31 December 2017</b>					
Cost/deemed cost	7,198	129	535	80	7,942
Accumulated amortisation (and impairment charges)	(293)	(54)	(331)	(50)	(728)
<b>Net carrying amount</b>	<b>6,905</b>	<b>75</b>	<b>204</b>	<b>30</b>	<b>7,214</b>
<b>At 1 January 2017, net carrying amount</b>	<b>7,396</b>	<b>89</b>	<b>229</b>	<b>47</b>	<b>7,761</b>
Translation Adjustment	(593)	(10)	(22)	(4)	(629)
Arising on acquisition (note 31)	487	4	51	1	543
Reclassified as held for sale	(363)	-	(8)	(1)	(372)
Disposals	(22)	-	(1)	-	(23)
Amortisation charge for year (ii)	-	(8)	(45)	(13)	(66)
<b>At 31 December 2017, net carrying amount</b>	<b>6,905</b>	<b>75</b>	<b>204</b>	<b>30</b>	<b>7,214</b>

The equivalent disclosure for the prior year is as follows:

<b>At 31 December 2016</b>					
Cost/deemed cost	7,701	142	659	87	8,589
Accumulated amortisation (and impairment charges)	(305)	(53)	(430)	(40)	(828)
<b>Net carrying amount</b>	<b>7,396</b>	<b>89</b>	<b>229</b>	<b>47</b>	<b>7,761</b>
<b>At 1 January 2016, net carrying amount</b>	<b>7,406</b>	<b>91</b>	<b>264</b>	<b>59</b>	<b>7,820</b>
Translation adjustment	(2)	2	6	1	7
Arising on acquisition (note 31)	71	3	11	-	85
Disposals	(56)	-	(1)	-	(57)
Amortisation charge for year (ii)	-	(7)	(51)	(13)	(71)
Impairment charge for year	(23)	-	-	-	(23)
<b>At 31 December 2016, net carrying amount</b>	<b>7,396</b>	<b>89</b>	<b>229</b>	<b>47</b>	<b>7,761</b>

<b>At 1 January 2016</b>					
Cost/deemed cost	7,699	137	639	85	8,560
Accumulated amortisation (and impairment charges)	(293)	(46)	(375)	(26)	(740)
<b>Net carrying amount</b>	<b>7,406</b>	<b>91</b>	<b>264</b>	<b>59</b>	<b>7,820</b>

(i) The customer-related intangible assets relate predominantly to non-contractual customer relationships.

(ii) The amortisation charge for the year includes €5 million (2016: €9 million; 2015: €11 million) relating to discontinued operations, which primarily relates to customer-related intangible assets.



## 15. Intangible Assets - continued

### Annual goodwill testing

The net book value of goodwill capitalised under previous GAAP (Irish GAAP) as at the transition date to IFRS (1 January 2004) has been treated as deemed cost. Goodwill arising on acquisition since that date is capitalised at cost.

### Cash-generating units

Goodwill acquired through business combination activity has been allocated to cash-generating units (CGUs) that are expected to benefit from synergies in that combination. The CGUs represent the lowest level within the Group at which the associated goodwill is monitored for internal management purposes, and are not larger than the operating segments determined in accordance with IFRS 8 *Operating Segments*. A total of 25 (2016: 25) CGUs have been identified and these are analysed between the six business segments and Americas Distribution below. All businesses within the various CGUs exhibit similar and/or consistent profit margin and asset intensity characteristics. Assets, liabilities, deferred tax and goodwill have been assigned to the CGUs on a reasonable and consistent basis.

	Cash-generating units		Goodwill (€m)	
	2017	2016	2017	2016
Europe Heavyside*	14	14	1,770	1,679
Europe Lightside	1	1	365	365
Europe Distribution	1	1	671	665
Europe	16	16	2,806	2,709
Americas Materials*	6	6	2,082	2,077
Americas Products	1	1	1,555	1,671
Americas Distribution	1	1	-	411
Americas	8	8	3,637	4,159
Asia	1	1	462	528
Total Group	25	25	6,905	7,396

\* Within the goodwill figures included above for the Europe Heavyside and Americas Materials segments is €339 million of goodwill unallocated to a CGU due to the completion of two acquisitions in quarter four 2017.

### Impairment testing methodology and results

Goodwill is subject to impairment testing on an annual basis. The recoverable amount of 24 CGUs is determined based on a value-in-use computation, using Level 3 inputs in accordance with the fair value hierarchy. The held for sale assets (Americas Distribution CGU) were considered separately on a fair value less costs to sell basis, given that a market price has been agreed.

The cash flow forecasts are primarily based on a five-year strategic plan document formally approved by the Board of Directors and specifically exclude the impact of future development activity. These cash flows are projected forward for an additional five years to determine the basis for an annuity-based terminal value, calculated on the same basis as the Group's acquisition modelling methodology. As in prior years, the terminal value is based on a 20-year annuity, with the exception of certain long-lived cement assets, where an assumption of a 30-year annuity has been used. Projected cash flows beyond the initial evaluation period have been extrapolated using real growth rates ranging from 0.5% to 2.0% in Europe, 1.3% to 1.4% in the Americas and 3.5% in Asia.

Such real growth rates do not exceed the long-term average growth rates for the countries in which each CGU operates. The value-in-use represents the present value of the future cash flows, including the terminal value, discounted at a rate appropriate to each CGU. The real pre-tax discount rates used range from 7.0% to 10.3% (2016: 7.1% to 12.0%); these rates are in line with the Group's estimated weighted average cost of capital, arrived at using the Capital Asset Pricing Model.

The 2017 annual goodwill impairment testing process has resulted in no intangible asset impairments. The 2016 annual goodwill impairment testing process resulted in an impairment of €23 million being recorded in respect of one CGU in the Europe Heavyside segment.

### Key sources of estimation uncertainty

The cash flows have been arrived at taking account of the Group's strong financial position, its established history of earnings and cash flow generation and the nature of the building materials industry, where product obsolescence is very low. However, expected future cash flows are inherently uncertain and are therefore

liable to material change over time. The key assumptions employed in arriving at the estimates of future cash flows factored into impairment testing are subjective and include projected EBITDA (as defined)\* margins, net cash flows, discount rates used and the duration of the discounted cash flow model.

Significant under-performance in any of CRH's major CGUs may give rise to a material write-down of goodwill which would have a substantial impact on the Group's income and equity, however given the excess headroom on the models the likelihood of this happening is not considered a realistic possibility.

### Significant goodwill amounts

The goodwill allocated to the UK (Europe Heavyside segment) and the Oldcastle Building Products (Americas Products segment) CGUs account for between 10% and 25% of the total carrying amount shown on page 153. The goodwill allocated to each of the remaining CGUs is less than 10% of the total carrying value in all other cases. The additional disclosures required for the two CGUs with significant goodwill are as follows:

	United Kingdom		Oldcastle Building Products	
	2017	2016	2017	2016
Goodwill allocated to the cash-generating unit at balance sheet date	€725m	€748m	€1,555m	€1,670m
Discount rate applied to the cash flow projections (real pre-tax)	7.6%	7.8%	10.3%	11.7%
Average EBITDA (as defined)* margin over the initial 5-year period	13.9%	13.7%	15.1%	14.4%
Value-in-use (present value of future cash flows)	€3,221m	€3,549m	€5,628m	€4,695m
Excess of value-in-use over carrying amount	€1,334m	€1,338m	€2,152m	€1,388m

The key assumptions and methodology used in respect of these two CGUs are consistent with those described above. The values applied to each of the key estimates and assumptions are specific to the individual CGUs and were derived from a combination of internal and external factors based on historical experience and took into account the cash flows specifically associated with these businesses. The cash

flows and 20-year annuity-based terminal value were projected in line with the methodology disclosed above.

The UK and Oldcastle Building Products CGUs are not included in the CGUs referred to in the Sensitivity analysis section overleaf. Given the magnitude of the excess of value-in-use over carrying amount, and our belief that the key

assumptions are reasonable, management believes that it is not reasonably possible that there would be a change in the key assumptions such that the carrying amount would exceed the value-in-use. Consequently no further disclosures relating to sensitivity of the value-in-use computations for the UK or Oldcastle Building Products CGUs are considered to be warranted.



## 15. Intangible Assets - continued

### Sensitivity analysis

Sensitivity analysis has been performed and results in additional disclosures in respect of one CGU (in the Europe Heavyside segment) of the total 25 CGUs. The key assumptions, methodology used and values applied to each of the key assumptions for this CGU are in line with those outlined on page 155 (a 30-year annuity period has been used). This CGU had goodwill of €169 million at the date of testing. The table below identifies the amounts by which each of the following assumptions may either decline or increase to arrive at a zero excess of the present value of future cash flows over the book value of net assets in the CGU selected for sensitivity analysis disclosures:

	<u>One cash-generating unit</u>
Reduction in EBITDA (as defined)* margin	2.9 percentage points
Reduction in profit before tax	22.2%
Reduction in net cash flow	18.2%
Increase in pre-tax discount rate	<u>1.7 percentage points</u>

The average EBITDA (as defined)\* margin for the CGU over the initial five-year period was 24.0%. The value-in-use (being the present value of the future net cash flows) was €289 million and the carrying amount was €236 million, resulting in an excess of value-in-use over carrying amount of €53 million.

## 16. Financial Assets

Share of net assets	Investments accounted for using the equity method (i.e. joint ventures and associates)			Other (i)
	€m	Loans €m	Total €m	
<b>At 1 January 2017</b>	<b>1,152</b>	<b>147</b>	<b>1,299</b>	<b>26</b>
Translation adjustment	(67)	(16)	(83)	(1)
Investments and advances	5	6	11	-
Disposals and repayments	(1)	(12)	(13)	-
Share of profit after tax	65	-	65	-
Dividends received	(31)	-	(31)	-
<b>At 31 December 2017</b>	<b>1,123</b>	<b>125</b>	<b>1,248</b>	<b>25</b>

The equivalent disclosure for the prior year is as follows:

<b>At 1 January 2016</b>	<b>1,161</b>	<b>156</b>	<b>1,317</b>	<b>28</b>
Translation adjustment	(14)	3	(11)	-
Investments and advances	1	6	7	-
Reduction in joint venture loans	-	(5)	(5)	-
Disposals and repayments	2	(13)	(11)	(2)
Share of profit after tax	42	-	42	-
Dividends received	(40)	-	(40)	-
<b>At 31 December 2016</b>	<b>1,152</b>	<b>147</b>	<b>1,299</b>	<b>26</b>

(i) Other financial assets primarily comprise trade investments carried at historical cost.

Summarised financial information for the Group's investment in joint ventures and associates which are accounted for using the equity method is as follows:

	Joint Ventures		Associates		Total	
	2017 €m	2016 €m	2017 €m	2016 €m	2017 €m	2016 €m
Non-current assets	752	727	754	845	1,506	1,572
Current assets	209	171	492	413	701	584
Non-current liabilities	(348)	(285)	(73)	(182)	(421)	(467)
Current liabilities	(115)	(102)	(548)	(435)	(663)	(537)
<b>Net assets</b>	<b>498</b>	<b>511</b>	<b>625</b>	<b>641</b>	<b>1,123</b>	<b>1,152</b>

A listing of the principal equity accounted investments is contained on page 251.

The Group holds a 21.13% stake (2016: 21.13%) in Samse S.A., a publicly-listed distributor in France which is accounted for as an associate investment above. The fair value of this investment at the balance sheet date, calculated based on the number of shares held multiplied by the closing share price at 31 December 2017 (Level 1 input in the fair value hierarchy), was €125 million (2016: €107 million).



## 17. Inventories

	2017 €m	2016 €m
Raw materials	885	821
Work-in-progress (i)	92	94
Finished goods	1,738	2,024
<b>Total inventories at the lower of cost and net realisable value</b>	<b>2,715</b>	<b>2,939</b>

(i) Work-in-progress includes €2 million (2016: €2 million) in respect of the cumulative costs incurred, net of amounts transferred to cost of sales under percentage-of-completion accounting, for construction contracts in progress at the balance sheet date.

An analysis of the Group's cost of sales expense is provided in note 3 to the financial statements.

Write-downs of inventories recognised as an expense within cost of sales amounted to €31 million (2016: €17 million; 2015: €12 million).

## 18. Trade and Other Receivables

	2017 €m	2016 €m
<b>Current</b>		
Trade receivables	2,456	2,773
Amounts receivable in respect of construction contracts (i)	773	792
<b>Total trade receivables, gross</b>	<b>3,229</b>	<b>3,565</b>
Provision for impairment	(131)	(152)
<b>Total trade receivables, net</b>	<b>3,098</b>	<b>3,413</b>
Amounts receivable from equity accounted investments	8	9
Prepayments and other receivables	524	557
<b>Total</b>	<b>3,630</b>	<b>3,979</b>
<b>Non-current</b>		
Other receivables	156	212

The carrying amounts of current and non-current trade and other receivables approximate their fair value largely due to the short-term maturities and nature of these instruments.

(i) Includes unbilled revenue and retentions held by customers in respect of construction contracts at the balance sheet date amounting to €176 million and €154 million respectively (2016: €149 million and €167 million respectively).

### Valuation and qualifying accounts (provision for impairment)

The movements in the provision for impairment of receivables during the financial year were as follows:

	2017 €m	2016 €m	2015 €m
<b>At 1 January</b>	<b>152</b>	<b>161</b>	<b>106</b>
Translation adjustment	(7)	(1)	5
Provided during year	32	43	40
Reclassified (as)/from held for sale	(6)	-	2
Disposed of during year	-	(1)	(4)
Written off during year	(36)	(43)	(36)
Arising on acquisition (note 31)	3	2	55
Recovered during year	(7)	(9)	(7)
<b>At 31 December</b>	<b>131</b>	<b>152</b>	<b>161</b>

Information in relation to the Group's credit risk management is provided in note 22 to the financial statements.

### Aged analysis

The aged analysis of trade receivables and amounts receivable in respect of construction contracts at the balance sheet date was as follows:

	2017 €m	2016 €m
Neither past due nor impaired	2,070	2,414
<i>Past due but not impaired:</i>		
- less than 60 days	832	774
- 60 days or greater but less than 120 days	129	120
- 120 days or greater	67	105
Past due and impaired (partial or full provision)	131	152
<b>Total</b>	<b>3,229</b>	<b>3,565</b>

Trade receivables and amounts receivable in respect of construction contracts are in general receivable within 90 days of the balance sheet date.



## 19. Trade and Other Payables

	2017 €m	2016 €m
<b>Current</b>		
Trade payables	2,304	2,531
Construction contract-related payables (i)	217	296
Deferred and contingent acquisition consideration (ii)	167	61
Accruals and other payables	1,802	1,875
Amounts payable to equity accounted investments	44	52
<b>Total</b>	<b>4,534</b>	<b>4,815</b>
<b>Non-current</b>		
Other payables	128	221
Deferred and contingent acquisition consideration (ii)	98	240
<b>Total</b>	<b>226</b>	<b>461</b>

(i) Construction contract-related payables include billings in excess of revenue, together with advances received from customers in respect of work to be performed under construction contracts and foreseeable losses thereon.

Other than deferred and contingent consideration, the carrying amounts of trade and other payables approximate their fair value largely due to the short-term maturities and nature of these instruments.

(ii) The fair value of total contingent consideration is €118 million (2016: €136 million), (Level 3 input in the fair value hierarchy) and deferred consideration is €147 million (2016: €165 million). On an undiscounted basis, the corresponding basis for which the Group may be liable for contingent consideration ranges from €nil million to a maximum of €118 million. The movement in deferred and contingent consideration during the financial year was as follows:

	2017 €m	2016 €m
<b>At 1 January</b>	<b>301</b>	<b>288</b>
Translation adjustment	(36)	9
Arising on acquisitions and investments during year (note 31)	45	22
Changes in estimate	3	15
Paid during year	(53)	(57)
Discount unwinding	7	24
Reclassified as held for sale	(2)	-
<b>At 31 December</b>	<b>265</b>	<b>301</b>

## 20. Movement in Working Capital and Provisions for Liabilities

	Inventories €m	Trade and other receivables €m	Trade and other payables €m	Provisions for liabilities €m	Total €m
<b>At 1 January 2017</b>	<b>2,939</b>	<b>4,191</b>	<b>(5,276)</b>	<b>(1,060)</b>	<b>794</b>
Translation adjustment	(218)	(286)	348	72	(84)
Arising on acquisition (note 31)	114	129	(149)	(49)	45
Reclassified as held for sale	(266)	(334)	306	-	(294)
Disposals	(34)	(16)	20	1	(29)
<i>Deferred and contingent acquisition consideration:</i>					
- arising on acquisitions during year (note 31)	-	-	(45)	-	(45)
- paid during year	-	-	53	-	53
Deferred proceeds arising on disposals during year	-	3	-	-	3
Interest accruals and discount unwinding	-	1	-	(24)	(23)
Reclassification	(3)	(14)	65	-	48
Increase/(decrease) in working capital and provisions for liabilities	183	112	(82)	(4)	209
<b>At 31 December 2017</b>	<b>2,715</b>	<b>3,786</b>	<b>(4,760)</b>	<b>(1,064)</b>	<b>677</b>

The equivalent disclosure for the prior years is as follows:

	2017 €m	2016 €m
<b>At 1 January 2016</b>	<b>2,873</b>	<b>4,126</b>
Translation adjustment	20	(12)
Arising on acquisition (note 31)	9	28
Disposals	(18)	(15)
<i>Deferred and contingent acquisition consideration:</i>		
- arising on acquisitions during year (note 31)	-	-
- paid during year	-	-
Deferred proceeds arising on disposals during year	-	7
Interest accruals and discount unwinding	-	-
Transfer to property, plant and equipment	-	(8)
Increase/(decrease) in working capital and provisions for liabilities	55	65
<b>At 31 December 2016</b>	<b>2,939</b>	<b>4,191</b>

	2017 €m	2016 €m
<b>At 1 January 2015</b>	<b>2,260</b>	<b>2,729</b>
Translation adjustment	130	147
Arising on acquisition (note 31)	621	1,533
Reclassified from held for sale	102	79
Disposals	(211)	(178)
<i>Deferred and contingent acquisition consideration:</i>		
- arising on acquisitions during year (note 31)	-	-
- paid during year	-	-
Deferred proceeds arising on disposals during year	-	38
Interest accruals and discount unwinding	-	-
Decrease in working capital and provisions for liabilities	(29)	(222)
<b>At 31 December 2015</b>	<b>2,873</b>	<b>4,126</b>



## 21. Analysis of Net Debt

### Components of net debt

Net debt is a non-GAAP measure which we provide to investors as we believe they find it useful. Net debt comprises cash and cash equivalents, derivative financial instrument assets and liabilities and interest-bearing loans and borrowings and enables investors to see the economic effects of these in total (see note 22 for details of the capital and risk management policies employed by the Group). Net debt is commonly used in computations such as net debt as a % of total equity and net debt as a % of market capitalisation.

	As at 31 December 2017		As at 31 December 2016	
	Fair value (i) €m	Book value €m	Fair value (i) €m	Book value €m
Cash and cash equivalents (note 23)	2,135	2,135	2,449	2,449
Interest-bearing loans and borrowings (note 24)	(8,421)	(7,981)	(8,236)	(7,790)
Derivative financial instruments (net) (note 25)	50	50	44	44
<b>Group net debt</b>	<b>(6,236)</b>	<b>(5,796)</b>	<b>(5,743)</b>	<b>(5,297)</b>

(i) All interest-bearing loans and borrowings are Level 2 fair value measurements.

### Reconciliation of opening to closing net debt

	2017 €m	2016 €m	2015 €m
At 1 January	(5,297)	(6,618)	(2,492)
Debt in acquired companies (note 31)	(12)	(3)	(175)
Debt in disposed companies	-	-	20
Increase in interest-bearing loans, borrowings and finance leases	(1,010)	(600)	(5,633)
Net cash flow arising from derivative financial instruments	(169)	5	(47)
Repayment of interest-bearing loans, borrowings and finance leases	343	2,015	2,744
Decrease in cash and cash equivalents	(153)	(127)	(897)
Mark-to-market adjustment	9	21	(1)
Translation adjustment	493	10	(137)
<b>At 31 December</b>	<b>(5,796)</b>	<b>(5,297)</b>	<b>(6,618)</b>

The following table shows the effective interest rates on period-end fixed, gross and net debt:

	As at 31 December 2017			As at 31 December 2016		
	€m	Interest rate	Weighted average fixed period Years	€m	Interest rate	Weighted average fixed period Years
Interest-bearing loans and borrowings nominal - fixed rate (i)	(7,844)			(7,417)		
Derivative financial instruments - fixed rate	1,505			1,640		
<b>Net fixed rate debt including derivatives</b>	<b>(6,339)</b>	<b>3.3%</b>	<b>9.2</b>	<b>(5,777)</b>	<b>3.5%</b>	<b>8.7</b>
Interest-bearing loans and borrowings nominal - floating rate (ii)	(70)			(270)		
Adjustment of debt from nominal to book value (i)	(67)			(103)		
Derivative financial instruments - currency floating rate	(1,455)			(1,596)		
<b>Gross debt including derivative financial instruments</b>	<b>(7,931)</b>	<b>4.2%</b>		<b>(7,746)</b>	<b>4.1%</b>	
Cash and cash equivalents - floating rate	2,135			2,449		
<b>Group net debt</b>	<b>(5,796)</b>			<b>(5,297)</b>		
Cash at bank and in hand reclassified as held for sale (note 23)	(20)			-		
Bank overdrafts reclassified as held for sale (note 24)	5			-		
<b>Group net debt excluding net debt reclassified as held for sale</b>	<b>(5,811)</b>			<b>(5,297)</b>		

(i) Of the Group's nominal fixed rate debt at 31 December 2017, €1,505 million (2016: €1,640 million) is hedged to floating rate using interest rate swaps.

(ii) Floating rate debt comprises bank borrowings and finance leases bearing interest at rates set in advance for periods ranging from overnight to less than one year largely by reference to inter-bank interest rates.

### Currency profile

The currency profile of the Group's net debt and net worth (capital and reserves attributable to the Company's equity holders) as at 31 December 2017 and 31 December 2016 is as follows:

	euro €m	US Dollar €m	Pound Sterling €m	Canadian Dollar €m	Philippine Peso €m	Polish Zloty €m	Swiss Franc €m	Other (j) €m	Total €m
Cash and cash equivalents (note 23)*	743	714	215	140	43	99	61	100	2,115
Interest-bearing loans and borrowings (note 24)*	(3,827)	(3,097)	(465)	(2)	(293)	-	(281)	(11)	(7,976)
Derivative financial instruments (net) (note 25)	2,078	(908)	(157)	(480)	(17)	(171)	(247)	(48)	50
<b>Net debt* by major currency including derivative financial instruments</b>	<b>(1,006)</b>	<b>(3,291)</b>	<b>(407)</b>	<b>(342)</b>	<b>(267)</b>	<b>(72)</b>	<b>(467)</b>	<b>41</b>	<b>(5,811)</b>
<i>Non-debt assets and liabilities (including cash and bank overdrafts reclassified as held for sale) analysed as follows:</i>									
Non-current assets	5,030	8,815	2,400	1,466	1,292	310	715	1,804	21,832
Current assets	1,935	3,718	692	454	110	138	302	273	7,622
Non-current liabilities	(713)	(1,311)	(295)	(206)	(153)	(5)	(181)	(98)	(2,962)
Current liabilities	(1,745)	(2,093)	(806)	(322)	(137)	(130)	(186)	(285)	(5,704)
Non-controlling interests	(49)	(14)	-	-	(391)	-	(11)	(21)	(486)
<b>Capital and reserves attributable to the Company's equity holders</b>	<b>3,452</b>	<b>5,824</b>	<b>1,584</b>	<b>1,050</b>	<b>454</b>	<b>241</b>	<b>172</b>	<b>1,714</b>	<b>14,491</b>

The equivalent disclosure for the prior year is as follows:

Cash and cash equivalents (note 23)	690	1,284	72	145	16	21	89	132	2,449
Interest-bearing loans and borrowings (note 24)	(3,840)	(2,957)	(464)	(1)	(197)	(1)	(306)	(24)	(7,790)
Derivative financial instruments (net) (note 25)	2,397	(1,246)	(208)	(612)	-	(80)	(209)	2	44
<b>Net debt by major currency including derivative financial instruments</b>	<b>(753)</b>	<b>(2,919)</b>	<b>(600)</b>	<b>(468)</b>	<b>(181)</b>	<b>(60)</b>	<b>(426)</b>	<b>110</b>	<b>(5,297)</b>
<i>Non-debt assets and liabilities analysed as follows:</i>									
Non-current assets	4,476	9,311	2,485	1,541	1,459	288	797	1,790	22,147
Current assets	1,809	3,064	749	471	97	149	325	258	6,922
Non-current liabilities	(641)	(1,885)	(276)	(247)	(238)	(4)	(350)	(97)	(3,738)
Current liabilities	(1,610)	(2,059)	(892)	(320)	(125)	(118)	(199)	(268)	(5,591)
Non-controlling interests	(46)	(16)	-	-	(472)	(1)	(12)	(1)	(548)
<b>Capital and reserves attributable to the Company's equity holders</b>	<b>3,235</b>	<b>5,496</b>	<b>1,466</b>	<b>977</b>	<b>540</b>	<b>254</b>	<b>135</b>	<b>1,792</b>	<b>13,895</b>

(j) The principal currencies included in this category are the Chinese Renminbi, the Romanian Leu, the Indian Rupee, the Ukrainian Hryvnia and the Serbian Dinar.

\* Excluding €20 million cash and €5 million bank overdrafts reclassified as held for sale which are analysed by major currency in current assets and liabilities above.





## 21. Analysis of Net Debt - continued

### Liquidity and capital resources

The following table provides certain information related to our cash generation and changes in our cash and cash equivalents position:

	2017	2016	2015
	€m	€m	€m
Net cash inflow from operating activities	2,189	2,340	2,247
Net cash outflow from investing activities	(2,685)	(735)	(7,306)
Net cash inflow/(outflow) from financing activities	343	(1,732)	4,162
<b>Decrease in cash and cash equivalents</b>	<b>(153)</b>	<b>(127)</b>	<b>(897)</b>
Cash and cash equivalents at beginning of year, excluding overdrafts (note 23)	2,449	2,518	3,295
Effect of exchange rate changes	(161)	58	120
<b>Cash and cash equivalents at end of year, excluding overdrafts (note 23)</b>	<b>2,135</b>	<b>2,449</b>	<b>2,518</b>
Bank overdrafts	(71)	(78)	(117)
Borrowings	(7,910)	(7,712)	(9,104)
Derivative financial instruments	50	44	85
<b>Total liabilities from financing activities</b>	<b>(7,931)</b>	<b>(7,746)</b>	<b>(9,136)</b>
<b>Net debt at end of year</b>	<b>(5,796)</b>	<b>(5,297)</b>	<b>(6,618)</b>
Cash at bank and in hand reclassified as held for sale (note 23)	(20)	-	-
Bank overdrafts reclassified as held for sale (note 24)	5	-	-
<b>Group net debt excluding net debt reclassified as held for sale</b>	<b>(5,811)</b>	<b>(5,297)</b>	<b>(6,618)</b>

Part of the Group's financing strategy objectives include maintenance of adequate financial resources and liquidity. During 2017 the Group's total net cash inflow from operating activities of €2.2 billion plus net cash inflow from financing activities of €0.3 billion funded investing activities of €2.7 billion.

The Group believes that its financial resources (operating cash together with cash and cash equivalents of €2.1 billion and undrawn committed loan facilities of €3.6 billion) will be sufficient to cover the Group's cash requirements.

At 31 December 2017, euro and US Dollar denominated cash and cash equivalents represented 35% (2016: 28%) and 34% (2016: 52%) of total cash and cash equivalents respectively.

### Significant borrowings

The main sources of Group debt funding are public bond markets in Europe and North America. The following bonds were outstanding as at 31 December 2017:

	Annual coupons	Outstanding millions	Final maturity
US Dollar bonds (i)	8.125%	US\$288	2018
euro bonds	5.000%	€500	2019
euro bonds	2.750%	€750	2020
US Dollar bonds	5.750%	US\$400	2021
euro bonds	1.750%	€600	2021
Swiss Franc bonds	1.375%	CHF330	2022
euro bonds	3.125%	€750	2023
euro bonds	1.875%	€600	2024
US Dollar bonds	3.875%	US\$1,250	2025
US Dollar bonds	3.400%	US\$600	2027
euro bonds	1.375%	€600	2028
Pound Sterling bonds	4.125%	£400	2029
US Dollar bonds (ii)	6.400%	US\$213	2033
US Dollar bonds	5.125%	US\$500	2045
US Dollar bonds	4.400%	US\$400	2047

(i) Originally issued as a US\$650 million bond in July 2008. In May 2017, US\$362.13 million of the issued notes were redeemed by the issuer as part of liability management exercise.

(ii) Originally issued as a US\$300 million bond in September 2003. In August 2009 and December 2010, US\$87.445 million of the issued notes were acquired by CRH plc as part of liability management exercises undertaken.

## 22. Capital and Financial Risk Management

### Capital management

#### Overall summary

The primary objectives of CRH's capital management strategy are to ensure that the Group maintains a strong credit rating to support its business and to create shareholder value by managing the debt and equity balance and the cost of capital. No changes were made in the objectives, policies or processes for managing capital during 2017.

The Board periodically reviews the capital structure of the Group, including the cost of capital and the risks associated with each class of capital. The Group manages and, if necessary, adjusts its capital structure taking account of underlying economic conditions; any material adjustments to the Group's capital structure in terms of the relative proportions of debt and equity are approved by the Board. In order to maintain or adjust the capital structure, the Group may issue new shares, dispose of assets, amend investment plans, alter dividend policy or return capital to shareholders.

The Group is committed to optimising the use of its balance sheet within the confines of the overall objective to maintain an investment grade credit rating. Dividend cover for the year ended 31 December 2017 amounted to 3.34 times (2016: 2.31 times).

The capital structure of the Group, which comprises net debt and capital and reserves attributable to the Company's equity holders, may be summarised as follows:

	2017	2016
	€m	€m
Capital and reserves attributable to the Company's equity holders	14,491	13,895
Net debt	5,796	5,297
<b>Capital and net debt</b>	<b>20,287</b>	<b>19,192</b>

#### Financial risk management objectives and policies

The Group uses financial instruments throughout its businesses: interest-bearing loans and borrowings, cash and cash equivalents and finance leases are used to finance the Group's operations; trade receivables and trade payables arise directly from operations; and derivatives, principally interest rate and currency swaps and forward foreign exchange contracts, are used to manage interest rate risks and currency exposures and to achieve the desired profile of borrowings. The Group does not trade in financial instruments nor does it enter into any leveraged derivative transactions.

The Group's corporate treasury function provides services to the business units, co-ordinates access to domestic and international financial markets, and monitors and manages the financial risks relating to the operations of the Group. The Group Treasurer reports to the General Manager of Finance and the activities of the corporate treasury function are subject to regular internal audit. Systems and processes are in place to monitor and control the Group's liquidity risks. The Group's net debt position forms part of the monthly documentation presented to the Board.

The main risks attaching to the Group's financial instruments are interest rate risk, foreign currency risk, credit risk and liquidity risk. Commodity price risk arising from financial instruments is of minimal relevance given that exposure is confined to a small number of contracts entered into for the purpose of hedging future movements in energy costs. The Board reviews and agrees policies for the prudent management of each of these risks as documented below.

#### Interest rate risk

The Group's exposure to market risk for changes in interest rates stems predominantly from its long-term debt obligations. Interest cost is managed using a mix of fixed and floating rate debt. With the objective of managing this mix in a cost-efficient manner, the Group enters into interest rate swaps, under which the Group contracts to exchange, at predetermined intervals, the difference between fixed and variable interest amounts calculated by reference to a pre-agreed notional principal. Such contracts enable the Group to mitigate the risk of changing interest rates on the fair value of issued fixed rate debt and the cash flow exposures of issued floating rate debt.

The majority of these swaps are designated under IAS 39 *Financial Instruments: Recognition and Measurement* to hedge underlying debt obligations and qualify for hedge accounting; undesignated financial instruments are termed "not designated as hedges" in the analysis of derivative financial instruments presented in note 25.

The following table demonstrates the impact on profit before tax and total equity of a range of possible changes in the interest rates applicable to net floating rate borrowings, with all other variables held constant. These impacts are calculated based on the closing balance sheet for the relevant period and assume all floating interest rates and interest curves change by the same amount. For profit before tax, the impact shown is the impact on closing balance sheet

floating rate net debt for a full year while for total equity the impact shown is the impact on the value of financial instruments.

Percentage change in cost of borrowings (i)	+/- 1%		+/- 0.5%	
	2017	+/- €6m	2016	+/- €3m
Impact on profit before tax	2017	+/- €6m	+/- €3m	+/- €3m
	2016	+/- €6m	+/- €3m	+/- €3m
	2015	-/+ €15m	-/+ €7m	-/+ €7m
Impact on total equity	2017	-/+ €0.4m	-/+ €0.2m	-/+ €0.2m
	2016	-/+ €1m	-/+ €0.5m	-/+ €0.5m
	2015	-/+ €7m	-/+ €4m	-/+ €4m

(i) Sensitivity analysis for cost of borrowing has been presented for continuing operations only.

#### Foreign currency risk

Due to the nature of building materials, which in general have a low value-to-weight ratio, the Group's activities are conducted primarily in the local currency of the country of operation resulting in low levels of foreign currency transaction risk; variances arising in this regard are reflected in operating costs or cost of sales in the Consolidated Income Statement in the period in which they arise.

Given the Group's presence in 32 countries worldwide, the principal foreign exchange risk arises from fluctuations in the euro value of the Group's net investment in a wide basket of currencies other than the euro; such changes are reported separately within the Consolidated Statement of Comprehensive Income. A currency profile of the Group's net debt and net worth is presented in note 21. The Group's established policy is to spread its net worth across the currencies of its various operations with the objective of limiting its exposure to individual currencies and thus promoting consistency with the geographical balance of its operations. In order to achieve this objective, the Group manages its borrowings, where practicable and cost effective, to hedge a portion of its foreign currency assets. Hedging is done using currency borrowings in the same currency as the assets being hedged or through the use of other hedging methods such as currency swaps.



## 22. Capital and Financial Risk Management - continued

The following table demonstrates the sensitivity of profit before tax and equity to selected movements in the relevant euro/US Dollar exchange rate (with all other variables held constant); the US Dollar has been selected as the appropriate currency for this analysis given the materiality of the Group's activities in the US. The impact on profit before tax is based on changing the euro/US Dollar exchange rate used in calculating profit before tax for the period. The impact on total equity and financial instruments is calculated by changing the euro/US Dollar exchange rate used in measuring the closing balance sheet.

Percentage change in relevant €/US\$ exchange rate (i)

	+/- 5%	+/- 2.5%
Impact on profit before tax		
2017	-/+ €53m	-/+ €27m
2016	-/+ €54m	-/+ €27m
2015	-/+ €27m	-/+ €14m
Impact on total equity*		
2017	-/+ €291m	-/+ €146m
2016	-/+ €275m	-/+ €137m
2015	-/+ €230m	-/+ €115m

\* Includes the impact on financial instruments which is as follows:

	+/- €165m	+/- €82m
2017	+/- €165m	+/- €82m
2016	+/- €146m	+/- €73m
2015	+/- €181m	+/- €91m

(i) Sensitivity analysis for exchange rates has been presented for continuing operations only.

Financial instruments include deposits, money market funds, bank loans, medium-term notes and other fixed term debt, interest rate swaps, commodity swaps and foreign exchange contracts. They exclude trade receivables and trade payables.

### Credit/counterparty risk

In addition to cash at bank and in hand, the Group holds significant cash balances which are invested on a short-term basis and are classified as cash equivalents (see note 23). These deposits and other financial instruments (principally certain derivatives and loans and receivables included within financial assets) give rise to credit risk on amounts due from counterparty financial institutions (stemming from their insolvency or a downgrade in their credit ratings). Credit risk is managed by limiting the aggregate amount and duration of exposure to any one counterparty primarily depending on its credit rating and by regular review of these ratings. Acceptable credit ratings are high investment-grade ratings - in general - counterparties have ratings of A3/A- or higher from Moody's/Standard & Poor's ratings agencies.

The maximum exposure arising in the event of default on the part of the counterparty (including insolvency) is the carrying value of the relevant financial instrument.

In its worldwide insurance programme, the Group carries appropriate levels of insurance for typical business risks (including product liability) with various leading insurance companies. However, in the event of the failure of one or more of its insurance counterparties, the Group could be impacted by losses where recovery from such counterparties is not possible.

Credit risk arising in the context of the Group's operations is not significant with the total bad debt provision at the balance sheet date amounting to 4.1% of gross trade receivables (2016: 4.3%). Customer credit risk is managed at appropriate Group locations according to established policies, procedures and controls. Customer credit quality is assessed in line with strict credit rating criteria and credit limits are established where appropriate. Outstanding customer balances are regularly monitored and a review for indicators of impairment (evidence of financial difficulty of the customer, payment default, breach of contract etc.) is carried out at each reporting date. Significant balances are reviewed individually while smaller balances are grouped and assessed collectively. Receivables balances are in general unsecured and non-interest-bearing. The trade receivables balances disclosed in note 18 comprise a large number of customers spread across the Group's activities and geographies with balances classified as "neither past due nor impaired" representing 64% of the total trade receivables balance at the balance sheet date (2016: 68%); amounts receivable from related parties (notes 18 and 33) are immaterial. Factoring and credit guarantee arrangements are employed in certain of the Group's operations where deemed to be of benefit by operational management.

### Liquidity risk

The principal liquidity risks faced by the Group stem from the maturation of debt obligations and derivative transactions. A downgrade of CRH's credit ratings may give rise to increases in funding costs in respect of future debt and may impair the Group's ability to raise funds on acceptable terms. The Group's corporate treasury function ensures that sufficient resources are available to meet such liabilities as they fall due through a combination of cash and cash equivalents, cash flows and undrawn committed bank facilities. Flexibility in funding sources is achieved through a variety of means including (i) maintaining cash and cash equivalents only with a diverse group of highly-rated counterparties;

(ii) limiting the annual maturity of such balances; (iii) borrowing the bulk of the Group's debt requirements under committed bank lines or other term financing; and (iv) having surplus committed lines of credit.

The undrawn committed facilities available to the Group as at the balance sheet date are quantified in note 24; these facilities span a wide number of highly-rated financial institutions thus minimising any potential exposure arising from concentrations in borrowing sources. The repayment schedule (analysed by maturity date) applicable to the Group's outstanding interest-bearing loans and borrowings as at the balance sheet date is also presented in note 24.

The Group has an €8 billion Euro Medium-Term Note (EMTN) Programme in place, which along with a €1.5 billion Euro Commercial Paper Programme and a US\$1.5 billion US Dollar Commercial Paper Programme means we have framework programmes in the money and capital markets in place that allow the Group to issue in the relevant markets within a short period of time.

### Commodity price risk

The fair value of derivatives used to hedge future energy costs was €11 million favourable as at the balance sheet date (2016: €2 million unfavourable).

The tables below show the projected contractual undiscounted total cash outflows (principal and interest) arising from the Group's trade and other payables, gross debt and derivative financial instruments. The tables also include the gross cash inflows projected to arise from derivative financial instruments. These projections are based on the interest and foreign exchange rates applying at the end of the relevant financial year.

	Within 1 year €m	Between 1 and 2 years €m	Between 2 and 3 years €m	Between 3 and 4 years €m	Between 4 and 5 years €m	After 5 years €m	Total €m
<b>At 31 December 2017</b>							
<i>Financial liabilities - cash outflows</i>							
Trade and other payables	4,534	126	38	20	16	36	4,770
Finance leases	3	2	2	1	1	3	12
Other interest-bearing loans and borrowings	320	501	751	934	362	5,082	7,950
Interest payments on finance leases	1	-	-	-	-	2	3
Interest payments on other interest-bearing loans and borrowings (i)	283	260	231	200	184	1,381	2,539
Cross-currency swaps - gross cash outflows	2,391	-	-	-	-	-	2,391
<b>Gross projected cash outflows</b>	<b>7,532</b>	<b>889</b>	<b>1,022</b>	<b>1,155</b>	<b>563</b>	<b>6,504</b>	<b>17,665</b>

### Derivative financial instruments - cash inflows

Interest rate swaps - net cash inflows (ii)	(26)	(14)	(13)	(13)	(13)	(16)	(95)
Cross-currency swaps - gross cash inflows	(2,399)	-	-	-	-	-	(2,399)
<b>Gross projected cash inflows</b>	<b>(2,425)</b>	<b>(14)</b>	<b>(13)</b>	<b>(13)</b>	<b>(13)</b>	<b>(16)</b>	<b>(2,494)</b>

The equivalent disclosure for the prior year is as follows:

<b>At 31 December 2016</b>							
<i>Financial liabilities - cash outflows</i>							
Trade and other payables	4,815	311	46	72	14	41	5,299
Finance leases	2	2	2	2	1	5	14
Other interest-bearing loans and borrowings	280	620	501	751	980	4,589	7,721
Interest payments on finance leases	1	1	1	1	-	2	6
Interest payments on other interest-bearing loans and borrowings (i)	279	278	228	198	166	1,154	2,303
Cross-currency swaps - gross cash outflows	2,904	-	-	-	-	-	2,904
<b>Gross projected cash outflows</b>	<b>8,281</b>	<b>1,212</b>	<b>778</b>	<b>1,024</b>	<b>1,161</b>	<b>5,791</b>	<b>18,247</b>
<i>Derivative financial instruments - cash inflows</i>							
Interest rate swaps - net cash inflows (ii)	(30)	(30)	(17)	(16)	(16)	(45)	(154)
Cross-currency swaps - gross cash inflows	(2,894)	-	-	-	-	-	(2,894)
<b>Gross projected cash inflows</b>	<b>(2,924)</b>	<b>(30)</b>	<b>(17)</b>	<b>(16)</b>	<b>(16)</b>	<b>(45)</b>	<b>(3,048)</b>

(i) At 31 December 2017 and 31 December 2016, a portion of the Group's long-term debt carried variable interest rates. The Group uses the interest rates in effect on 31 December to calculate the interest payments on the long-term debt for the periods indicated.

(ii) The Group uses interest rate swaps to help manage its interest cost. Under these contracts the Group has agreed to exchange at predetermined intervals, the difference between fixed and variable interest amounts calculated by reference to a pre-agreed notional principal. The Group uses the interest rates in effect on 31 December to calculate the net interest receipts or payments on these contracts.



## 23. Cash and Cash Equivalents

Cash and cash equivalents balances are spread across a wide number of highly-rated financial institutions. The credit risk attaching to these items is documented in note 22.

Cash and cash equivalents are included in the Consolidated Balance Sheet at fair value and are analysed as follows:

	2017	2016
	€m	€m
Cash at bank and in hand	737	1,141
Investments (short-term deposits)	1,378	1,308
<b>Total</b>	<b>2,115</b>	<b>2,449</b>

Cash at bank earns interest at floating rates based on daily deposit bank rates. Short-term deposits, which include bank and money market deposits, are made for varying periods of between one day and three months depending on the immediate cash requirements of the Group, and earn interest at the respective short-term deposit rates.

Cash and cash equivalents at fair value include the following for the purposes of the Consolidated Statement of Cash Flows:

	2017	2016
	€m	€m
Cash at bank and in hand	737	1,141
Investments (short-term deposits)	1,378	1,308
Cash at bank and in hand reclassified as held for sale	20	-
<b>Total</b>	<b>2,135</b>	<b>2,449</b>

## 24. Interest-bearing Loans and Borrowings

### Loans and borrowings outstanding

	2017	2016
	€m	€m
Bank overdrafts	66	78
Bank loans	295	200
Finance leases	12	14
Bonds	7,602	7,497
Other	1	1
<b>Interest-bearing loans and borrowings</b>	<b>7,976</b>	<b>7,790</b>
Bank overdrafts reclassified as held for sale	5	-
<b>Total</b>	<b>7,981</b>	<b>7,790</b>

Interest-bearing loans and borrowings include loans of €2 million (2016: €3 million) secured on specific items of property, plant and equipment; these figures do not include finance leases.

### Maturity profile of loans and borrowings and undrawn committed facilities

	As at 31 December 2017		As at 31 December 2016	
	Loans and borrowings	Undrawn committed facilities	Loans and borrowings	Undrawn committed facilities
	€m	€m	€m	€m
Within one year	316	-	275	197
Between one and two years	498	-	629	-
Between two and three years	746	-	500	-
Between three and four years	930	-	748	91
Between four and five years	359	3,554	978	2,746
After five years	5,127	-	4,660	-
<b>Total</b>	<b>7,976</b>	<b>3,554</b>	<b>7,790</b>	<b>3,034</b>
Amounts due within one year reclassified as held for sale	5	-	-	-
<b>Total</b>	<b>7,981</b>	<b>3,554</b>	<b>7,790</b>	<b>3,034</b>

The Group manages its borrowing ability by entering into committed borrowing agreements. Revolving committed bank facilities are generally available to the Group for periods of up to five years from the date of inception. The undrawn committed facilities figures shown in the table above represent the facilities available to be drawn by the Group at 31 December 2017.

#### Guarantees

The Company has given letters of guarantee to secure obligations of subsidiary undertakings as follows: €7.7 billion in respect of loans and borrowings, bank advances, derivative obligations and future lease obligations (2016: €7.6 billion) and €0.2 billion in respect of letters of credit (2016: €0.3 billion).

Any Irish registered wholly-owned subsidiary of the Company may avail of the exemption from filing its statutory financial statements for the year ended 31 December 2017 as permitted by Section 357 of the Companies Act 2014 and if an Irish registered wholly-owned subsidiary of the Company elects to avail of this exemption,

there will be in force an irrevocable guarantee from the Company in respect of all commitments entered into by such wholly-owned subsidiary, including amounts shown as liabilities (within the meaning of Section 357(1)(b) of the Companies Act 2014) in such wholly-owned subsidiary's statutory financial statements for the year ended 31 December 2017.

#### Lender covenants

The Group's major bank facilities require the Group to maintain certain financial covenants. Non-compliance with financial covenants would give the relevant lenders the right to terminate facilities and demand early repayment of any sums drawn thereunder thus altering the maturity profile of the Group's debt and the Group's liquidity. Calculations for financial covenants are completed for twelve-month periods half-yearly on 30 June and 31 December. The Group was in full compliance with its financial covenants throughout each of the periods presented. The Group is not aware of any stated events of default as defined in the Agreements.

The financial covenants are:

- (1) *Minimum interest cover* defined as PBITDA/net interest (all as defined in the relevant agreement) cover at no lower than 4.5 times (2016: 4.5 times; 2015: 4.5 times). As at 31 December 2017 the ratio was 11.6 times (2016: 10.1 times; 2015: 8.5 times);
- (2) *Minimum net worth* defined as total equity plus deferred tax liabilities and capital grants less repayable capital grants being in aggregate no lower than €6.2 billion (2016: €6.2 billion) (such minimum being adjusted for foreign exchange translation impacts). As at 31 December 2017 net worth (as defined in the relevant agreement) was €16.6 billion (2016: €16.4 billion).



## 25. Derivative Financial Instruments

The fair values of derivative financial instruments are analysed by year of maturity and by accounting designation as follows:

	Fair value hedges €m	Cash flow hedges €m	Net investment hedges €m	Not designated as hedges €m	Total €m
<b>At 31 December 2017</b>					
<b>Derivative assets</b>					
Within one year - current assets	2	11	19	2	34
Between one and two years	-	1	-	3	4
After five years	26	-	-	-	26
<b>Non-current assets</b>	<b>26</b>	<b>1</b>	<b>-</b>	<b>3</b>	<b>30</b>
<b>Total derivative assets</b>	<b>28</b>	<b>12</b>	<b>19</b>	<b>5</b>	<b>64</b>
<b>Derivative liabilities</b>					
Within one year - current liabilities	-	(1)	(10)	-	(11)
After five years	(3)	-	-	-	(3)
<b>Non-current liabilities</b>	<b>(3)</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>(3)</b>
<b>Total derivative liabilities</b>	<b>(3)</b>	<b>(1)</b>	<b>(10)</b>	<b>-</b>	<b>(14)</b>
<b>Net asset arising on derivative financial instruments</b>	<b>25</b>	<b>11</b>	<b>9</b>	<b>5</b>	<b>50</b>
<i>The equivalent disclosure for the prior year is as follows:</i>					
<b>At 31 December 2016</b>					
<b>Derivative assets</b>					
Within one year - current assets	-	2	21	-	23
Between one and two years	13	1	-	-	14
Between two and three years	-	-	-	6	6
After five years	33	-	-	-	33
<b>Non-current assets</b>	<b>46</b>	<b>1</b>	<b>-</b>	<b>6</b>	<b>53</b>
<b>Total derivative assets</b>	<b>46</b>	<b>3</b>	<b>21</b>	<b>6</b>	<b>76</b>
<b>Derivative liabilities</b>					
Within one year - current liabilities	-	(1)	(31)	-	(32)
<b>Total derivative liabilities</b>	<b>-</b>	<b>(1)</b>	<b>(31)</b>	<b>-</b>	<b>(32)</b>
<b>Net asset/(liability) arising on derivative financial instruments</b>	<b>46</b>	<b>2</b>	<b>(10)</b>	<b>6</b>	<b>44</b>

At 31 December 2017 and 2016, the Group had no master netting or similar arrangements, collateral posting requirements, or enforceable right of set-off agreements with any of its derivative counterparts.

Fair value hedges consist of interest rate swaps and currency swaps. These instruments hedge risks arising from changes in asset/liability fair values due to interest rate and foreign exchange rate movements.

Cash flow hedges consist of forward foreign exchange and commodity contracts and interest rate and currency swaps. These instruments hedge risks arising to future cash flows from movements in foreign exchange rates, commodity prices and interest rates. Cash flow hedges are expected to affect profit and loss over the period to maturity.

Net investment hedges comprise cross-currency swaps and hedge changes in the value of net investments due to currency movements.

The (loss)/profit arising on fair value, cash flow, net investment hedges and related hedged items reflected in the Consolidated Income Statement is shown below:

	2017 €m	2016 €m	2015 €m
Fair value of hedge instruments	(16)	(11)	(16)
Fair value of the hedged items	18	13	13

### Components of other comprehensive income - cash flow hedges

Gains/(losses) arising during the year:

	2017 €m	2016 €m	2015 €m
- commodity forward contracts	9	14	(2)
- currency forward contracts	(1)	-	-
<b>Total</b>	<b>8</b>	<b>14</b>	<b>(2)</b>

### Fair value hierarchy

Assets measured at fair value

	2017 Level 2 €m	2016 Level 2 €m
Fair value hedges - cross-currency and interest rate swaps	28	46
Net investment hedges - cross-currency swaps	19	21
Cash flow hedges - cross-currency, interest rate swaps and commodity forwards	12	3
Not designated as hedges (held for trading) - interest rate swaps	5	6
<b>Total</b>	<b>64</b>	<b>76</b>

Liabilities measured at fair value

	2017 Level 2 €m	2016 Level 2 €m
Fair value hedges - cross-currency and interest rate swaps	(3)	-
Net investment hedges - cross-currency swaps	(10)	(31)
Cash flow hedges - cross-currency, interest rate swaps and commodity forwards	(1)	(1)
<b>Total</b>	<b>(14)</b>	<b>(32)</b>

At 31 December 2017 and 2016 there were no derivatives valued using Level 1 or Level 3 fair value techniques.



## 26. Provisions for Liabilities

	At 1 January €m	Translation adjustment €m	Arising on acquisition (note 31) €m	Provided during year €m	Utilised during year €m	Disposed during year €m	Reversed unused €m	Discount unwinding €m	At 31 December €m
<b>31 December 2017</b>									
Insurance (i)	286	(28)	3	101	(61)	-	(19)	10	292
Environment and remediation (ii)	430	(25)	43	27	(29)	-	(14)	9	441
Rationalisation and redundancy (iii)	23	-	-	32	(27)	-	(3)	-	25
Other (iv)	321	(19)	3	106	(37)	(1)	(72)	5	306
<b>Total</b>	<b>1,060</b>	<b>(72)</b>	<b>49</b>	<b>266</b>	<b>(154)</b>	<b>(1)</b>	<b>(108)</b>	<b>24</b>	<b>1,064</b>
<i>Analysed as:</i>									
Non-current liabilities	678								693
Current liabilities	382								371
<b>Total</b>	<b>1,060</b>								<b>1,064</b>

The equivalent disclosure for the prior year is as follows:

	At 1 January €m	Translation adjustment €m	Arising on acquisition (note 31) €m	Provided during year €m	Utilised during year €m	Disposed during year €m	Reversed unused €m	Discount unwinding €m	At 31 December €m
<b>31 December 2016</b>									
Insurance (i)	244	5	-	105	(76)	-	(11)	19	286
Environment and remediation (ii)	450	(21)	(16)	38	(17)	(1)	(9)	6	430
Rationalisation and redundancy (iii)	26	-	1	23	(25)	-	(2)	-	23
Other (iv)	315	(10)	(3)	77	(29)	-	(34)	5	321
<b>Total</b>	<b>1,035</b>	<b>(26)</b>	<b>(18)</b>	<b>243</b>	<b>(147)</b>	<b>(1)</b>	<b>(56)</b>	<b>30</b>	<b>1,060</b>
<i>Analysed as:</i>									
Non-current liabilities	603								678
Current liabilities	432								382
<b>Total</b>	<b>1,035</b>								<b>1,060</b>

Notes (i) to (iv) are set out overleaf.

- (i) This provision relates to actual and potential obligations arising under the self-insurance components of the Group's insurance arrangements which comprise employers' liability (workers' compensation in the US), public and products liability (general liability in the US), automobile liability, property damage, business interruption and various other insurances; a substantial proportion of the total provision pertains to claims which are classified as "incurred but not reported". Due to the extended timeframe associated with many of the insurances, a significant proportion of the total provision is subject to periodic actuarial valuation. The projected cash flows underlying the discounting process are established through the application of actuarial triangulations, which are extrapolated from historical claims experience. The triangulations applied in the discounting process indicate that the Group's insurance provisions have an average life of 5.5 years (2016: six years).
- (ii) This provision comprises obligations governing site remediation, restoration and environmental works to be incurred in compliance with either local or national environmental regulations together with constructive obligations stemming from established best practice. Whilst a significant element of the total provision will reverse in the medium-term (two to ten years), those legal and constructive obligations applicable to long-lived assets (principally mineral-bearing land) will unwind over a 30-year timeframe. In discounting the related obligations, expected future cash outflows have been determined with due regard to extraction status and anticipated remaining life.
- (iii) These provisions relate to irrevocable commitments under various rationalisation and redundancy programmes, none of which is individually material to the Group. In 2017, €32 million (2016: €23 million; 2015: €23 million) was provided in respect of rationalisation and redundancy activities as a consequence of undertaking various cost reduction initiatives across all operations. These initiatives included removing excess capacity from manufacturing and distribution networks and scaling operations to match market supply and demand; implementation of these initiatives resulted in a reduction in staffing levels in all business segments over recent years. The Group expects that these provisions will primarily be utilised within one to two years of the balance sheet date (2016: one to two years).
- (iv) Other provisions primarily relate to legal claims, onerous contracts, guarantees and warranties and employee related provisions. The Group expects the majority of these provisions will be utilised within two to five years of the balance sheet date (2016: two to five years); however due to the nature of the legal provisions there is a level of uncertainty in the timing of settlement as the Group generally cannot determine the extent and duration of the legal process.



## 27. Deferred Income Tax

The deductible and taxable temporary differences in respect of which deferred tax has been recognised are as follows:

	2017 €m	2016 €m
<b>Reported in balance sheet after offset</b>		
Deferred tax liabilities	1,666	2,008
Deferred tax assets	(95)	(159)
<b>Net deferred income tax liability</b>	<b>1,571</b>	<b>1,849</b>
<b>Deferred income tax assets (deductible temporary differences)</b>		
Deficits on Group retirement benefit obligations (note 28)	72	119
Revaluation of derivative financial instruments to fair value	7	12
Tax loss carryforwards	132	150
Share-based payment expense	29	38
Provisions for liabilities and working capital-related items	157	350
Other deductible temporary differences	145	83
<b>Total</b>	<b>542</b>	<b>752</b>

Deferred income tax assets have been recognised in respect of all deductible temporary differences, with the exception of some tax loss carryforwards. The amount of tax losses where recovery is not probable and is therefore not recognised in the Consolidated Balance Sheet is €1.5 billion (2016: €1.4 billion). The vast majority either do not expire based on current tax legislation or they expire post 2022 (2016: 2021).

### Deferred income tax liabilities (taxable temporary differences)

Taxable temporary differences principally attributable to accelerated tax depreciation and fair value adjustments arising on acquisition (i)	2,089	2,569
Revaluation of derivative financial instruments to fair value	11	18
Rolled-over capital gains	13	14
<b>Total</b>	<b>2,113</b>	<b>2,601</b>

### Movement in net deferred income tax liability

At 1 January	1,849	1,874
Translation adjustment	(173)	41
Net income for the year (note 11) (ii)	(265)	(15)
Arising on acquisition (note 31)	132	(35)
Reclassified as held for sale	(14)	-
Disposal (note 5)	2	(1)
Movement in deferred tax asset on Group retirement benefit obligations	33	(3)
Movement in deferred tax asset on share-based payment expense	7	(12)
<b>At 31 December</b>	<b>1,571</b>	<b>1,849</b>

(i) Fair value adjustments arising on acquisition principally relate to property, plant and equipment.

(ii) The net income for the year includes an expense of €1 million (2016: €2 million) relating to discontinued operations.

## 28. Retirement Benefit Obligations

The Group operates either defined benefit or defined contribution pension schemes in all of its principal operating areas. The disclosures included below relate to all pension schemes in the Group.

The Group operates defined benefit pension schemes in Belgium, Brazil, Canada, France, Germany, Italy, the Netherlands, the Philippines, the Republic of Ireland, Romania, Serbia, Slovakia, Switzerland, the UK and the US. The Group has a mixture of funded and unfunded defined benefit pension schemes. The net liability of the funded schemes is €175 million (2016: €444 million). Unfunded obligations (including jubilee, post-retirement healthcare obligations and long-term service commitments) comprise of a number of schemes in Brazil, Canada, France, Germany, Italy, the Netherlands, the Philippines, Romania, Serbia, Slovakia, Switzerland and the US, totalling a net liability of €202 million (2016: €147 million).

Funded defined benefit schemes in the Republic of Ireland, Switzerland and the UK are administered by separate funds that are legally distinct from the Group under the jurisdiction of Trustees. The Trustees of these pension funds are required by law and by their Articles of Association to act in the best interests of the scheme participants and are responsible for the definition of investment strategy and for scheme administration. Other schemes are also administered in line with the local regulatory environment. The level of benefits available to most members depends on length of service and either their average salary over their period of employment or their salary in the final years leading up to retirement. The Group's pension

schemes in Switzerland are contribution-based schemes with guarantees to provide further contributions in the event that certain targets are not met, largely in relation to investment return and the annuity conversion factor on retirement.

### Defined benefit pension schemes - principal risks

Through its defined benefit pension and jubilee schemes, long-term service commitments and post-retirement healthcare plans, the Group is exposed to a number of risks, the most significant of which are detailed below:

**Asset volatility:** Under IAS 19, the assets of the Group's defined benefit pension schemes are reported at fair value (using bid prices, where relevant). The majority of the schemes' assets comprise equities, bonds and property, all of which may fluctuate significantly in value from period to period. Given that liabilities are discounted to present value based on bond yields and that bond prices are inversely related to yields, an increase in the liability discount rate (which would reduce liabilities) would reduce bond values, though not necessarily by an equal magnitude.

Given the maturity of certain of the Group's funded defined benefit pension schemes, de-risking frameworks have been introduced to mitigate deficit volatility and enable better matching of investment returns with the cash outflows related to benefit obligations. These frameworks entail the usage of asset-liability matching techniques, whereby triggers are set for the conversion of equity holdings into bonds of similar average duration to the relevant liabilities.

**Discount rates:** The discount rates employed in determining the present value of the schemes' liabilities are determined by reference to market yields at the balance sheet date on high-quality corporate bonds of a currency and term consistent with the currency and term of the associated post-employment benefit obligations. Changes in discount rates impact the quantum of liabilities as discussed above.

**Inflation risk:** A significant amount of the Group's pension obligations are linked to inflation; higher inflation will lead to higher liabilities (although in most cases, caps on the level of inflationary increases are in place to protect the schemes against extreme inflation).

**Longevity risk:** In the majority of cases, the Group's defined benefit pension schemes provide benefits for life with spousal and dependent child reversionary provisions; increases in life expectancy will therefore give rise to higher liabilities.

### Aggregation

For the purposes of the disclosures which follow for 2017, 2016 and 2015; the schemes in Belgium, France, Germany, Italy, the Netherlands, the Republic of Ireland and Slovakia have been aggregated into a "Eurozone" category on the basis of common currency and financial assumptions; schemes in Brazil, the Philippines, Romania, Serbia and the UK have been aggregated into an "Other" category.



## 28. Retirement Benefit Obligations - continued

### Financial assumptions - scheme liabilities

The major long-term assumptions used by the Group's actuaries in the computation of scheme liabilities as at 31 December 2017, 31 December 2016 and 31 December 2015 are as follows:

	Eurozone			Switzerland			United States and Canada		
	2017	2016	2015	2017	2016	2015	2017	2016	2015
	%	%	%	%	%	%	%	%	%
<i>Rate of increase in:</i>									
- salaries	3.59	3.41	3.64	1.25	1.25	1.75	3.27	3.28	3.29
- pensions in payment	1.70	1.50	1.75	-	-	-	-	-	-
Inflation	1.75	1.50	1.75	0.75	0.75	0.75	2.00	2.00	2.00
Discount rate	2.05	1.86	2.61	0.70	0.65	0.85	3.52	4.01	4.22
Medical cost trend rate	n/a	n/a	n/a	n/a	n/a	n/a	6.33	5.98	6.21

The mortality assumptions employed in determining the present value of scheme liabilities under IAS 19 represent actuarial best practice in the relevant jurisdictions, taking account of mortality experience and industry circumstances. For schemes in the Republic of Ireland and the UK, the mortality assumptions used are in accordance with the underlying funding valuations. For the Group's most material schemes, the future life expectations factored into the relevant valuations, based on retirement at 65 years of age for current and future retirees, are as follows:

	Republic of Ireland			Switzerland			United States and Canada		
	2017	2016	2015	2017	2016	2015	2017	2016	2015
<i>Current retirees</i>									
- male	22.7	22.5	22.8	22.4	22.3	21.5	20.6	20.5	21.2
- female	24.4	24.3	24.9	24.4	24.3	24.0	23.1	23.0	23.4
<i>Future retirees</i>									
- male	25.5	25.4	25.8	24.6	24.6	23.6	22.3	22.3	23.0
- female	27.0	26.9	26.9	26.6	26.6	26.0	24.7	24.7	25.1

The above data allows for future improvements in life expectancy.

### Impact on Consolidated Income Statement

The total retirement benefit expense from continuing operations in the Consolidated Income Statement is as follows:

	2017	2016	2015
	€m	€m	€m
Total defined contribution expense	237	232	204
Total defined benefit (credit)/expense	(1)	75	77
<b>Total expense in Consolidated Income Statement</b>	<b>236</b>	<b>307</b>	<b>281</b>

At 31 December 2017, €78 million (2016: €89 million) was included in other payables relating to defined contribution pension liabilities.

### Analysis of defined benefit expense

	2017	2016	2015
Charged in arriving at Group profit before finance costs:			
Current service cost	62	61	63
Administration expenses	4	4	2
Past service credit (net)	(78)	(2)	(1)
Gain on settlements	-	-	(4)
<b>Subtotal</b>	<b>(12)</b>	<b>63</b>	<b>60</b>

Included in finance income and finance costs respectively:

	2017	2016	2015
Interest income on scheme assets	(49)	(58)	(50)
Interest cost on scheme liabilities	60	70	67
<b>Net interest expense</b>	<b>11</b>	<b>12</b>	<b>17</b>
<b>Net (credit)/expense to Consolidated Income Statement</b>	<b>(1)</b>	<b>75</b>	<b>77</b>

The composition of the net (credit)/expense to the Consolidated Income Statement is as follows:

	2017	2016	2015
Eurozone	25	18	27
Switzerland	(49)	37	37
United States and Canada	14	11	6
Other	9	9	7
<b>Total</b>	<b>(1)</b>	<b>75</b>	<b>77</b>

Past service credit in 2017 includes a gain of €81 million due to plan amendments in Switzerland. The principal amendment related to the reduction of the annuity conversion factor on retirement from 6.4% to 5.0% of accumulated savings.



## 28. Retirement Benefit Obligations - continued

	2017 €m	2016 €m
<b>Reconciliation of scheme assets (bid value)</b>		
At 1 January	2,556	2,399
<i>Movement in year</i>		
Interest income on scheme assets	49	58
Arising on acquisition (note 31)	5	-
Remeasurement adjustments		
- <i>return on scheme assets excluding interest income</i>	112	81
Employer contributions paid	123	133
Contributions paid by plan participants	14	14
Benefit and settlement payments	(114)	(130)
Administration expenses	(4)	(4)
Translation adjustment	(119)	5
<b>At 31 December</b>	<b>2,622</b>	<b>2,556</b>

The composition of scheme assets is as follows:

Eurozone	1,184	1,116
Switzerland	781	804
United States and Canada	448	453
Other	209	183
<b>Total</b>	<b>2,622</b>	<b>2,556</b>

### Reconciliation of actuarial value of liabilities

At 1 January	(3,147)	(2,987)
<i>Movement in year</i>		
Current service cost	(62)	(61)
Past service credit (net)	78	2
Interest cost on scheme liabilities	(60)	(70)
Arising on acquisition (note 31)	(57)	(1)
Remeasurement adjustments		
- <i>experience variations</i>	11	20
- <i>actuarial loss from changes in financial assumptions</i>	(29)	(176)
- <i>actuarial gain from changes in demographic assumptions</i>	20	14
Contributions paid by plan participants	(14)	(14)
Benefit and settlement payments	114	130
Translation adjustment	147	(4)
<b>At 31 December</b>	<b>(2,999)</b>	<b>(3,147)</b>

The composition of the actuarial value of liabilities is as follows:

Eurozone	(1,384)	(1,338)
Switzerland	(819)	(995)
United States and Canada	(540)	(554)
Other	(256)	(260)
<b>Total</b>	<b>(2,999)</b>	<b>(3,147)</b>

Recoverable deficit in schemes	(377)	(591)
Related deferred income tax asset	72	119
<b>Net pension liability</b>	<b>(305)</b>	<b>(472)</b>

The composition of the net pension liability is as follows:

Eurozone	(168)	(188)
Switzerland	(30)	(154)
United States and Canada	(68)	(65)
Other	(39)	(65)
<b>Total</b>	<b>(305)</b>	<b>(472)</b>

### Sensitivity analysis

The impact of a movement (as indicated below) in the principal actuarial assumptions would be as follows:

		Eurozone 2017 €m	Switzerland 2017 €m	United States and Canada 2017 €m	Other 2017 €m	Total Group 2017 €m
Scheme liabilities at 31 December 2017		(1,384)	(819)	(540)	(256)	(2,999)
<i>Revised liabilities</i>						
Discount rate	Increase by 0.25%	(1,325)	(785)	(524)	(244)	(2,878)
	Decrease by 0.25%	(1,448)	(856)	(556)	(269)	(3,129)
Inflation rate	Increase by 0.25%	(1,441)	(822)	(542)	(262)	(3,067)
	Decrease by 0.25%	(1,330)	(816)	(538)	(250)	(2,934)
Life expectancy	Increase by 1 year	(1,430)	(846)	(555)	(263)	(3,094)
	Decrease by 1 year	(1,338)	(791)	(527)	(249)	(2,905)

The above sensitivity analysis are derived through changing the individual assumption while holding all other assumptions constant.

	2017 €m	2016 €m
<b>Split of scheme assets</b>		
<i>Investments quoted in active markets</i>		
Equity instruments (i)	828	802
Debt instruments (ii)	1,413	1,191
Property	120	112
Cash and cash equivalents	26	37
Investment funds	95	148
<i>Unquoted investments</i>		
Equity instruments	2	1
Debt instruments (iii)	8	102
Property	92	120
Cash and cash equivalents	13	18
Assets held by insurance company	25	25
<b>Total assets</b>	<b>2,622</b>	<b>2,556</b>

(i) Equity instruments primarily relate to developed markets.

(ii) Quoted debt instruments are made up of €831 million (2016: €687 million) and €582 million (2016: €504 million) of non-government and government instruments respectively.

(iii) Unquoted debt instruments primarily relate to government debt instruments (2016: primarily non-government debt instruments).





## 28. Retirement Benefit Obligations - continued

### Actuarial valuations - funding requirements and future cash flows

In accordance with statutory requirements in the Republic of Ireland and minimum funding requirements in the UK, additional annual contributions and lump-sum payments are required to certain of the schemes in place in those jurisdictions. The funding requirements in relation to the Group's defined benefit schemes are assessed in accordance with the advice of independent and qualified actuaries and valuations are prepared in this regard either annually, where local requirements mandate that this be done, or at triennial intervals at a maximum in all other cases. In the Republic of Ireland and the UK, either the attained age or projected unit credit methods are used in the valuations. In the Netherlands and Switzerland, the actuarial valuations reflect the current unit method, while the valuations are performed in accordance with the projected unit credit methodology in Germany. In the US, valuations are performed using a variety of actuarial cost methodologies - current unit, projected unit and aggregate cost. In Canada, the projected unit credit method is used in valuations. The dates of the funding valuations range from April 2015 to July 2017.

In general, funding valuations are not available for public inspection; however, the results of valuations are advised to the members of the various schemes on request.

The Group's contracted payments (on a discounted basis) to certain schemes is €18 million (2016: €35 million; 2015: €52 million) in the Republic of Ireland and €16 million (2016: €20 million; 2015: €21 million) in the UK. The maturity profile of the Group's contracted payments (on a discounted basis) is as follows:

	Total		
	2017 €m	2016 €m	2015 €m
Within one year	19	20	20
Between one and two years	2	19	19
Between two and three years	2	2	19
Between three and four years	2	2	2
Between four and five years	1	2	2
After five years	8	10	11
	<u>34</u>	<u>55</u>	<u>73</u>

Employer contributions payable in the 2018 financial year including minimum funding payments (expressed using year-end exchange rates for 2017) are estimated at €112 million.

### Average duration and scheme composition

	Eurozone			Switzerland			United States and Canada		
	2017	2016	2015	2017	2016	2015	2017	2016	2015
Average duration of defined benefit obligation (years)	17.8	17.1	14.7	17.2	18.6	18.0	12.2	13.1	14.0
Allocation of defined benefit obligation by participant:									
Active plan participants	72%	63%	64%	84%	84%	85%	40%	41%	45%
Deferred plan participants	9%	12%	12%	-	-	-	16%	17%	17%
Retirees	19%	25%	24%	16%	16%	15%	44%	42%	38%

## 29. Commitments under Operating and Finance Leases

### Operating leases

The Group has entered into operating leases for a range of assets principally relating to property across the US and Europe. Lease commitments are provided for up to the earliest break clause in the lease. These property leases have varying terms, escalation clauses and renewal rights including periodic rent reviews linked with a consumer price index and/or other indices. The Group also leases plant and machinery, vehicles and equipment under operating leases. The terms and conditions of these operating leases do not impose any significant financial restriction on the Group.

	2017 €m	2016 €m	2015 €m
Within one year	419	402	370
After one year but not more than five years	962	978	915
More than five years	810	791	831
	<u>2,191</u>	<u>2,171</u>	<u>2,116</u>

The commitments above include €252 million of operating lease commitments (2016: €237 million; 2015: €172 million) relating to discontinued operations.

### Finance leases

Future minimum lease payments under finance leases are not material for the Group.



## 30. Share Capital and Reserves

Equity share capital	2017		2016	
	Ordinary Shares of €0.32 each (i)	Income Shares of €0.02 each (ii)	Ordinary Shares of €0.32 each (i)	Income Shares of €0.02 each (ii)
<i>Authorised</i>				
At 1 January and 31 December (€m)	400	25	400	25
Number of Shares at 1 January and 31 December (millions)	1,250	1,250	1,250	1,250
<i>Allotted, called-up and fully paid</i>				
At 1 January (€m)	269	15	266	15
Performance Share Plan Awards	1	-	-	-
Issue of scrip shares in lieu of cash dividends (iii)	1	-	2	-
Share options and share participation schemes	-	-	1	-
At 31 December (€m)	271	15	269	15

The movement in the number of shares (expressed in millions) during the financial year was as follows:

At 1 January	833	833	824	824
Performance Share Plan Awards	2	2	-	-
Issue of scrip shares in lieu of cash dividends (iii)	3	3	7	7
Share options and share participation schemes	1	1	2	2
At 31 December	839	839	833	833

(i) The Ordinary Shares represent 93.73% of the total issued share capital.

(ii) The Income Shares, which represent 5.86% of the total issued share capital, were created on 29 August 1988 for the express purpose of giving shareholders the choice of receiving dividends on either their Ordinary Shares or on their Income Shares (by notice of election to the Company). The Income Shares carried a different tax credit to the Ordinary Shares. The creation of the Income Shares was achieved by the allotment of fully paid Income Shares to each shareholder equal to his/her holding of Ordinary Shares but the shareholder is not entitled to an Income Share certificate, as a certificate for Ordinary Shares is deemed to include an equal number of Income Shares and a shareholder may only sell, transfer or transmit Income Shares with an equivalent number of Ordinary Shares. Income Shares carry no voting rights. Due to changes in Irish tax legislation since the creation of the Income Shares, dividends on the Company's shares no longer carry a tax credit. As elections made by shareholders to receive dividends on their holding of Income Shares were no longer relevant, the Articles of Association were amended on 8 May 2002 to cancel such elections.

(iii) Issue of scrip shares in lieu of cash dividends:

	Number of shares			Price per share		
	2017	2016	2015	2017	2016	2015
May 2017 - Final 2016 dividend (2016: Final 2015 dividend; 2015: Final 2014 dividend)	433,046	5,301,827	5,056,633	€33.08	€24.69	€24.60
October 2017 - Interim 2017 dividend (2016: Interim 2016 dividend; 2015: Interim 2015 dividend)	2,130,496	1,243,042	288,769	€29.24	€29.41	€26.16
<b>Total</b>	<b>2,563,542</b>	<b>6,544,869</b>	<b>5,345,402</b>			

### Share schemes

The aggregate number of shares which may be committed for issue in respect of any share option scheme, savings-related share option scheme, share participation scheme, performance share plan or any subsequent option scheme or share plan, may not exceed 10% of the issued ordinary share capital from time to time.

### Share option schemes

Details of share options granted under the Company's Share Option Schemes and the terms attaching thereto are provided in note 8 to the financial statements and on pages 88 to 89 of the Directors' Remuneration Report. Under these schemes, options over a total of 1,589,335 Ordinary Shares were exercised during the financial year (2016: 2,223,574; 2015: 2,876,066).

	Number of shares		
	2017	2016	2015
Options exercised during the year (satisfied by the issue of new shares)	1,589,335	2,209,638	-
Options exercised during the year (satisfied by the reissue of Treasury Shares)	-	13,936	2,876,066
<b>Total</b>	<b>1,589,335</b>	<b>2,223,574</b>	<b>2,876,066</b>

### Share participation schemes

As at 31 December 2017, 7,862,416 (2016: 7,729,412) Ordinary Shares had been appropriated to participation schemes. In the financial year ended 31 December 2017, the appropriation of 133,004 shares was satisfied by the issue of new shares (2016: 116,160). The Ordinary Shares appropriated pursuant to these schemes were issued at market value on the dates of appropriation. The shares issued pursuant to these schemes are excluded from the scope of IFRS 2 *Share-based Payment* and are hence not factored into the expense computation and the associated disclosures in note 8.

### Preference share capital

	5% Cumulative Preference Shares of €1.27 each		7% 'A' Cumulative Preference Shares of €1.27 each	
	Number of shares '000s	€m	Number of shares '000s	€m
<i>Authorised</i>				
At 1 January 2017 and 31 December 2017	150	-	872	1
<i>Allotted, called-up and fully paid</i>				
At 1 January 2017 and 31 December 2017	50	-	872	1

There was no movement in the number of cumulative preference shares in either the current or the prior year.

The holders of the 5% Cumulative Preference Shares are entitled to a fixed cumulative preference dividend at a rate of 5% per annum and priority in a winding-up to repayment of capital, but have no further right to participate in profits or assets and are not entitled to be present or vote at general meetings unless their dividend is in arrears. Dividends on the 5% Cumulative Preference Shares are payable half-yearly on 15 April and 15 October in each year. The 5% Cumulative Preference Shares represent 0.02% of the total issued share capital.

The holders of the 7% 'A' Cumulative Preference Shares are entitled to a fixed cumulative preference dividend at a rate of 7% per annum, and subject to the rights of the holders of the 5% Cumulative Preference Shares, priority in a winding-up to repayment of capital, but have no further right to participate in profits or assets and are not entitled to be present or vote at general meetings unless their dividend is in arrears or unless the business of the meeting includes certain matters, which are specified in the Articles of Association. Dividends on the 7% 'A' Cumulative Preference Shares are payable half-yearly on 5 April and 5 October in each year. The 7% 'A' Cumulative Preference Shares represent 0.39% of the total issued share capital.